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REPORT

ON THE

Chicago Transportation Problem

BY

BION J. ARNOLD.

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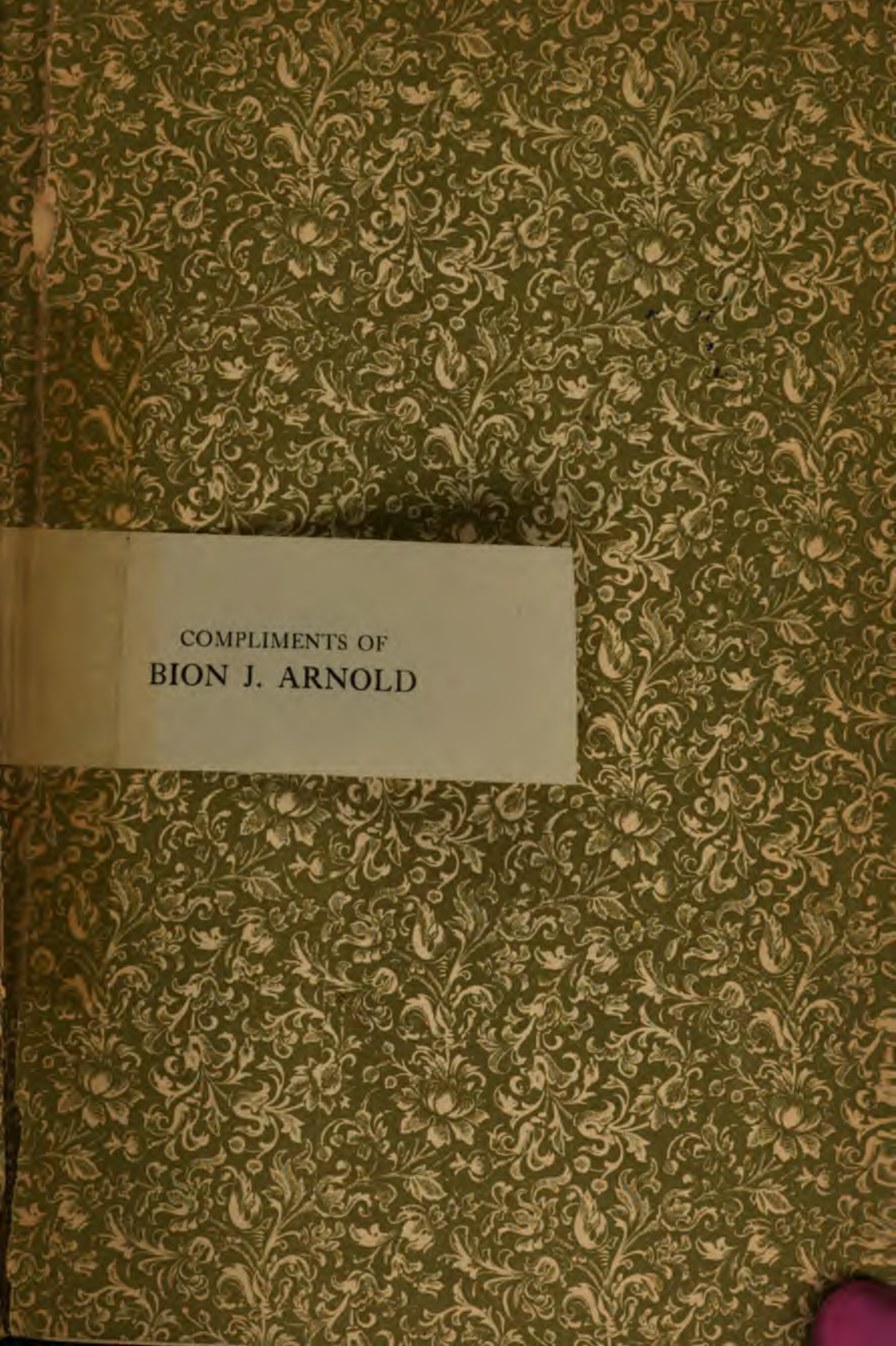

COMPLIMENTS OF
BION J. ARNOLD

REPORT

ON THE

ENGINEERING
AND
OPERATING FEATURES

OF THE

CHICAGO
TRANSPORTATION PROBLEM

SUBMITTED TO

THE COMMITTEE ON LOCAL TRANSPORTATION OF

THE CHICAGO CITY COUNCIL.

BY

BION JOSEPH ARNOLD. M. S., M. PH., E. E.
CHICAGO.

NOVEMBER, 1902.

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ORDINANCE OF THE CITY OF CHICAGO AUTHORIZING THE EXECUTION OF A CONTRACT FOR EXPERT SERVICES.

(Passed by the City Council May 26, 1902.)

Be it ordained by the City Council of the City of Chicago:

SECTION 1. That the Mayor and City Comptroller be and they are hereby authorized to make and execute a contract with B. J. Arnold for the rendering by said Arnold of such services as may be required by the Local Transportation Committee of the City Council, as expert engineer, in procuring information and furnishing estimates and opinions and in the preparation of a general report for said Committee in relation to the cost of operation and earnings of any traction company or companies, the capitalization of existing companies, all financial and scientific facts, practical matters, and statistics in relation to the same, valuation of existing traction plants, cost of new system, estimate of earnings of new system, designs for rails or any other part of the equipment of traction companies, and such other matters as may pertain to the work of said Committee; also in aiding said Committee as such expert engineer, in such ways as said Committee may deem advisable. The compensation for all services rendered under said contract shall not exceed the sum of ten thousand ($10,000.00) dollars. The time for the completion of said work and the time and mode of payment of said compensation shall be arranged and provided for in said contract as the Mayor and Comptroller may deem best.

SECTION 2. This ordinance shall take effect and be in force from and after its passage.

CONTRACT FOR EXPERT SERVICES BETWEEN THE CITY OF CHICAGO AND BION J. ARNOLD.

AGREEMENT Made between BION J. ARNOLD, party of the first part, and the CITY OF CHICAGO, party of the second part, in consideration of the mutual promises of the parties, WITNESSETH:—

1. Said Arnold agrees to render to the CITY OF CHICAGO such services as may be required by the Local Transportation Committee of the City Council, as expert engineer so far as may be necessary in procuring information and furnishing estimates, designs, plans, appraisals and opinions in all matters connected with the existing or possible traction companies, and in the preparation of a general report for said Committee in relation to the cost of operation and earnings of any Traction Company or Traction Companies, the capitalization of existing companies, all financial and scientific facts, theoretical and practical matters and statistics in relation to the same for the accomplishment of the following results:

(a) To make a valuation of present plants;

(b) To make estimate of cost of production of *new system* adequate to serve the public and designed along the lines of the best practice in vogue;

(c) To make estimate of net earnings to be derived from the operation of such new system based on present business, with estimate of probable increase in business in periods of five (5) years formulated from past performances, from which rates of compensation or adjustment of rates of fares can be computed;

(d) To make estimate of passengers carried during different hours of the day for the purpose of computing compensation;

(e) To make a report, based upon the best information he can secure, on rates of wages paid and rules and regulations under which employes are at present working, with recommendations for changes or concessions which it would be practicable for the companies to make should a demand for changes or concessions be made and the matter be brought before the Committee, and for the use of the Committee should it desire to embody in its Report to the Council any material on this question;

(f) To submit a design for rails for future use which will best protect the street pavement, and which will be practicable for the operation of cars under Chicago conditions, presenting arguments supporting such design and also presenting draft of rails adopted in other cities after investigation by municipal authorities, such investigations being brought about from similar causes as obtain in Chicago;

(g) To report on the feasibility and desirability of an underground conduit system in the down-town district, and on all trunk lines, within prescribed limits, with proper arrangements for transferring from underground to overhead trolley and vice versa without any disarrangement of the required headway of cars in either trunk or branch lines;

(h) To estimate the cost of constructing and operating a conduit system;

(i) To re-route the present lines outside of the business district so as to obtain in the best manner the very best transportation facilities to the patrons of such lines, maps to be prepared which will graphically display the re-routing;

(j) To make statements showing wherein the present system is inadequate, the causes for it, the maximum capacity of the present terminals in the business center;

(k) To furnish maps showing the present arrangements of terminal facilities in the business center and recommendations for a rearrangement of facilities to best serve the purposes, and showing tracks which it would be advisable to abandon, and tracks necessary to construct, eliminating grade crossings, and providing for the operation of through lines between the North and South sides of the City through the business center and in conjunction with the loop terminals from all divisions;

(l) To furnish preliminary plans for a system of subways in the business center, which, coupled with the surface system of terminal facilities or operated independently and without such surface system, will adequately accommodate the traveling public, provide for an increase of traffic in the years to come, relieve the congested condition and create a much larger area available for use by all lines of business; these plans to show a feasible disposition of all existing underground improvements, so disposed of as to permit of easy access for future repairs, renewals and reinforcements without disturbing the street surface;

(m) To show the necessity for and the entire practicability of the abandonment of the practice of operating cars in trains and substituting therefor single cars;

(n) To report on a universal system of transfers;

(o) To stand in readiness to attend personally or by a competent representative any meetings of the Committee at all times;

(p) To verbally report on any question arising, not covered in the foregoing and pertaining to transportation and construction matters, and to act as engineer in a consulting and advisory capacity when any question may come before the Committee or be submitted to it during the continuance of this Contract;

(q) To make an estimate of the value of all lines the franchises of which do not expire in 1903;

(r) To report on the relative merit of through routes as against downtown terminals;

(s) To report on joint use of tracks whenever such joint use may be necessary in his judgment;

(t) To report on the feasibility and cost of transforming the present cable lines into underground electric systems;

(u) To report on the rearrangement of the Union Loop;

(v) To report on a plan for the prevention of electrolysis;

(w) To provide an estimate for laying cement road bed for street car tracks and report on the advisability thereof.

2. In consideration of the performance by said ARNOLD of the foregoing services, the CITY OF CHICAGO agrees to pay to said ARNOLD the sum of Ten Thousand ($10,000) Dollars after the completion of all the work done hereunder and the acceptance thereof by the Chairman of the Committee on Local Transportation.

3. In case the progress and character of the work done by said ARNOLD hereunder is satisfactory to the Chairman of the Committee on Local Transportation. said ARNOLD may be paid not to exceed Two Thousand ($2,000) Dollars a month for the first four (4) months of this contract, One Thousand ($1,000)

Dollars on the completion and delivery of the main report and the entire balance due under this contract not later than July 1, 1903.

4. Said contract shall be in force from the date of its execution until the first day of July, A. D. 1903, unless terminated earlier by a vote of the majority of the Local Transportation Committee. All payments shall be made on vouchers approved by the Chairman of said Committee.

IN WITNESS WHEREOF, The said Bion J. Arnold has signed his name hereto, and the City of Chicago has caused this agreement to be executed in its name by its Comptroller, approved by its Mayor, and its corporate seal hereto affixed, duly attested by its City Clerk. this 19th day of July, A. D. 1902.

(Signed) BION J. ARNOLD.

(SEAL)

CITY OF CHICAGO,
(Signed) L. E. MCGANN,
City Comptroller.

Attest:
(Signed) WM. LOEFFLER,
City Clerk.

APPROVED:
(Signed) CARTER H. HARRISON,
Mayor.

MEMBERS OF THE COMMITTEE ON LOCAL TRANSPORTATION OF THE CITY COUNCIL OF THE CITY OF CHICAGO.

Ald. FRANK I. BENNETT, Chairman

Ald. E. F. HERRMANN
Ald. WM. MAVOR
Ald. F. D. CONNERY
Ald. W. S. JACKSON
Ald. JOHN MINWEGEN
Ald. MILTON J. FOREMAN
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Ald. CHARLES WERNO
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Ald. W. T. MAYPOLE
Ald. HUBERT W. BUTLER

LETTER OF TRANSMITTAL.

To the Honorable Chairman and Members of the Committee on Local Transportation of the City Council of the City of Chicago:

GENTLEMEN—

I have the honor to present herewith my report on the several questions relating to the city's Local Transportation situation submitted to me by your Honorable Body, as set forth in the agreement between the City of Chicago and myself, bearing date of July 19th, 1902, a copy of which is hereto attached.

The situation has been thoroughly canvassed. The operating statistics of the Chicago City Railway Company and the Chicago Union Traction Company have been willingly submitted, and an exhaustive study of them has been made. All facilities have been extended to me by the officials and departmental heads of these companies, and the officials of the several elevated railroad companies, as well as the several companies controlling the underground utilities, all of whom have very kindly, and with considerable trouble to themselves, furnished me with the data required in my investigation. The officials of several railway companies operating roads in other cities have courteously furnished me with valuable statistics.

All recorded information contained in the several bureaus of the city government and the personal knowledge on all subjects pertaining to the transportation matter possessed by the several bureau chiefs has been freely placed at my disposal, for all of which assistance rendered and courtesies extended I desire at this time to express my thanks and appreciation.

I have not assumed it my place to take sides in the report one way or the other on questions of municipal policy concerning which there may be differences of opinion, except where the questions are in their nature clearly engineering or transportation questions. The franchise policy of the city with reference to these matters I have conceived to be outside of my province. The plans for a comprehensive system of street railways suited to the needs of the community as set forth in the report would be the same whether the system be owned and operated by a private corporation, or owned and operated by the city, or owned by the city and operated by a private corporation under lease. So far as engineering features alone are concerned, it is immaterial whether the subway systems as outlined be owned by the city or by a private corporation.

In connection with my investigation of this problem I have considered many plans, such as movable sidewalks, elevated sidewalks, sub-sidewalk railways, and elevated structures for carrying railways, pedestrians, and the present underground utilities, some of which plans originated with me and some with others, but after a careful study of the situation the magnitude of the problem as evidenced by the great number of passengers which must be taken in and out of the business district in very short periods of time, night and morning, has forced me to abandon some of my preconceived ideas, and it is my opinion that a full realization on the part of others of the exact conditions which must govern a comprehensive solution of this problem would show the advocates of the other plans the inadvisability of their adoption. It is possible, however, that some of the suggestions relating to super-surface structures may some day prove advisable to adopt in Chicago, but probably not until the capacities of the systems recommended in this report, or other similar systems, have been reached.

The question of the utilization of the water power of the Sanitary District Canal for generating electricity and transmitting it to Chicago for the operation of its street railways has also been considered, but inasmuch as a decision regarding it need not be made at present, and from the further fact that the question was not involved in my commission, I have not submitted a discussion of it.

I have endeavored to outline not only one plan but several plans, some of which if adopted would give to the citizens of Chicago the best surface railway transportation facilities capable of attainment under the conditions. These facilities cannot be attained at once, and the transition will probably be gradual. In order to make it possible to get immediate relief a plan of surface tracks, which could ultimately become a part of a combined system, has been outlined. This plan provides for ample facilities on the surface for the present needs, permits of through traffic between all divisions with the joint use of tracks, and makes it possible to immediately abandon the river tunnels for street car purposes, thereby permitting the river channel to be immediately deepened for the accommodation of lake traffic, and portions of the tunnels to be still retained for future subway uses.

In closing, I desire to acknowledge the valuable assistance rendered me by Messrs. Charles V. Weston, C. E., Augustine W. Wright, C. E., Oren Root, Jr., and George C. Sikes in the preparation of this report, and to thank the respective office forces of Mr. Weston and myself for faithful and efficient services rendered.

I also wish to acknowledge the consideration shown me by the Chairman and each member of your Honorable Committee for allowing me to perform my duty unhindered by suggestions, and I trust that the information contained in the report will be found sufficiently exhaustive and of sufficient merit to enable your Committee to formulate a line of action which will lead to practical results.

Respectfully submitted,

Bion J. Arnold

Consulting Electrical Engineer.

Chicago, Nov. 19th, 1902.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS.

I. THE ONE-CITY-ONE-FARE IDEA.

Chicago, with respect to transportation as well as other things, should be regarded as one city, not three. Divisional lines ought to be obliterated, as far as possible. A street car passenger should be carried over the most direct route between any two points within the city limits for a single fare. Complete unification of ownership and management is the best plan for realizing the One-City-One-Fare idea. The same end can be accomplished, however, but in a less satisfactory manner, under divisional ownership, by a plan of through routing of cars, joint use of tracks and interchangeable transfers. To a still less satisfactory degree the same end can be accomplished by the interchange of transfers between companies without joint use of tracks.

II. THE THROUGH ROUTE PRINCIPLE.

Routes through the business district ought to be substituted for down-town terminals, wherever possible. Outside the business district, too, the best results would follow from connecting together the detached lines now found on several streets, and operating cars over such lines from end to end on the through route principle.

III. SUBWAYS.

A system of subways should be, and eventually must be, built to accommodate the street car traffic of Chicago and relieve the street surface congestion in the business district. Galleries should be provided in connection with such subways for the accommodation of present and future underground utilities. Two subway plans are outlined in the report. One plan, referred to as Subway Plan No. 1, shown on map No. 11, calls for three north and south subways, from Fourteenth Street on the south to Indiana Street on the north, and two subways entering the business district from the West Side, utilizing the present Van Buren and Washington Street tunnels and looping back at Clark Street. This is a system of high level subways throughout, with no dips. Its estimated cost is $16,000,000. The other subway plan, known as Plan No. 2, shown on map No. 5, calls for practically the same north and south high level subways in combination with three or more low level subways from the West Side passing under the north and south subways and reaching Michigan Avenue, and should future developments warrant, under Lake Front Park as far as it may be extended. The low level subways would require the use of elevators. The estimated cost of subways built according to this plan is $20,000,000. Plan No. 2 is recommended as best for the city from an engineering and transportation point of view, but in case this plan is deemed inadvisable for business or other reasons a system of single-decked high level subways, as outlined in Plan No. 1, can be constructed, which will to a large extent accomplish the results. No subways should be built in such a manner as to preclude the operation of cars through them on the through route principle. Under either of the plans as outlined, the whole system of subways need not necessarily be constructed at once. One or more of the subways could be built at a time, and utilized separately, but with a view to their ultimately forming a part of a comprehensive system. The subway plans as submitted do not neçessarily call for the removal of all tracks from the street surface in the business district, and Subway Plan No. 1 necessitates some surface loops. Under either plan there could be a street surface system connecting the depots and designed to accommodate short haul traffic in the business district. Under Plan No. 2 there could also be a low level subway system for connecting all depots, and by using it in connection with this subway all tracks could be kept off from the surface of the streets in the business district for some years to come.

IV. THE PRESENT RIVER TUNNELS.

It is inadvisable to attempt to lower the present river tunnels and at the same time retain them for surface railway use, for the reason that lowering the tunnels to a sufficient depth to accommodate future river traffic would involve extending the tunnel approaches at least a block further into the business district. In the interest of navigation, therefore, the tops of the tunnels ought to be promptly removed, leaving the lower parts of one or perhaps two of the tunnels for utilization later as parts of a future subway system.

V. PLAN FOR A UNIFIED COMBINED SURFACE AND SUBWAY STREET RAILWAY SYSTEM.

A plan is presented for a new, reorganized and unified combined surface and subway street railway system, comprising the lines of the City Railway Company, the Union Traction Company, the Chicago General Railway Company and the Chicago Consolidated Traction Company within the city limits, and new lines necessary to properly connect the now disconnected parts of the system. The total single track mileage of this system as outlined would be about 745 miles, and its estimated cost if constructed new, with everything first-class throughout, but exclusive of subways, would be $70,000,000. Adding $20,000,000, the cost of the subways constructed according to Plan No. 2, would make the total cost of the new system complete $90,000,000. With Subway Plan No. 1, instead of Subway Plan No. 2, the total cost of the new unified system would be $85,800,000.

VI. PLANS FOR IMMEDIATE IMPROVEMENT OF TERMINALS AND SERVICE.

Plans are presented for the re-routing of surface terminals in the business district, (1) under the present divisional ownership and operation, (2) under the joint use of tracks in the business district under divisional ownership, and (3) under unified ownership and management. Immediate improvement of Chicago's local transportation facilities may be effected by substituting electric for cable power and routing cars according to any of the plans outlined, all cars from the West and North sides to enter the business district over bridges until such time as subways shall be constructed.

VII. ELECTRIC UNDERGROUND CONDUIT SYSTEM.

The operation of cars in Chicago by the electric underground conduit system is practicable and feasible. Overhead trolley construction should be prohibited within the area bounded by Twelfth Street on the south and the river on the north and west. Outside of the district named the objections to the overhead trolley are æsthetic in nature, and it is for the city authorities to say,—after a balancing of financial against æsthetic considerations,—how much, if any, underground conduit construction should be required. The cost per mile of single track (track alone, including feeders,) of electric conduit road construction would average $81,300 for a system covering the city at large, but exclusive of the cost of power, rolling stock and paving. Conduit construction, outside of the business district, should not exceed $70,000 per mile, but within the business district the cost would be about $100,000 per mile, due to the numerous curves, large amount of special work required and the extra cost of labor, due to the congestion within the district in which the work must be prosecuted. To either of the above figures should be added the cost of paving, as follows: Brick, $12,650; asphalt, $12,880; dressed granite, $18,400. Overhead trolley road construction would cost $28,000 per mile of single track, using the same weight of rail. It would cost nearly as much to convert the Chicago cable roads into electric conduit roads as to build new electric conduit roads.

VIII. GROOVED RAILS.

A grooved girder type of rail, of special design, is recommended for well-paved streets upon which cars operate often enough to properly clear the groove of dirt and ice. On outlying streets and on poorly paved and poorly maintained streets the girder type of rail should be maintained as best for team traffic and the railway companies.

IX. ELECTROLYSIS.

The destruction of underground utilities from electrolysis is now well in hand by the city, and if the present ordinance governing the subject is enforced no serious difficulties may be anticipated from this source, and when the underground conduit system is adopted there should be no further injury from electrolysis in the area served by the conduit system, because this system uses a complete metallic circuit.

X. THE FINANCIAL ASPECT OF THE ONE-CITY-ONE-FARE PLAN.

A unified company could afford to conduct the transportation business of Chicago on the basis of a single fare for a continuous ride anywhere within the city limits. The present divisional companies, by the interchange of transfers, could afford to do the same thing, provided they were properly protected against the fraudulent use of transfers, but it would be at a somewhat greater cost to themselves, and with greater inconvenience to passengers, than would be the case under unified management.

XI. GROWTH OF POPULATION AND TRAFFIC IN THE PAST AND ESTIMATES AS TO THE FUTURE INCREASE OF STREET CAR TRAFFIC.

The population of Chicago has increased since its incorporation in 1837 to 1902 at the rate of 8.6 per cent per year compounded, and is now increasing at the rate of 7.7 per cent per year. For the nine years from 1892 to 1901 inclusive, the number of revenue passengers carried by the Chicago surface and elevated lines combined has increased at the rate of 5 per cent per annum compounded. The increase for the surface lines during the same period has been at the rate of 1.5 per cent per year compounded. The increase for the combined surface and elevated lines from 1894 to 1901 inclusive, a period of seven years, has been at the rate of 6.3 per cent per year compounded. The increase for the surface lines alone during the same period has been at the rate of 3.9 per cent per year compounded, and the increase for the elevated lines alone has been for the same period at the rate of 26 per cent per year compounded. The population of Chicago has increased more rapidly than that of any other city in the world, but it is improbable that this rate of increase should continue indefinitely. Figures and curves are presented showing the past growth of Chicago as compared with other cities, also the future results if present rates of increase should be maintained, but as this is improbable curves are shown representing the increase in population and gross receipts that may reasonably be expected for the combined surface and elevated railways during the next fifty years.

XII. ESTIMATED COST OF REPRODUCTION AND PRESENT VALUE OF EXISTING PLANTS.

The cost to reproduce the following properties complete with new construction and equipment throughout would be: Chicago City Railway Company, about $17,200,000; Chicago Union Traction Company (not including the Consolidated Traction Co.), about $22,200,000. The actual present value of the physical properties for electric railway purposes of the following companies, taking into consideration the obsolete equipment and construction which must be discarded, but not taking into account any franchise rights or earning capacity of the properties, is estimated as follows: Chicago City Railway Company, about $12,000,000; Chicago Union Traction Company (not including Consolidated Traction Co.), about $15,000,000.

XIII. NEED FOR REGULATION OF TEAM TRAFFIC.

At the present time team traffic interferes with street cars to an unwarrantable extent. A reasonable regulation of team traffic is essential to the improvement of street car service.

XIV. THE UNION ELEVATED LOOP PROBLEM.

The junction points are the ultimate limiting factor of the capacity of the Union Elevated Loop. At the present time, however, the platform stations are the limiting factor. The first and simplest way to increase the capacity of the loop is to lengthen the station platforms so that two trains can load and unload at a station at the same time. When the capacity of the junction points is reached, added facilities can be provided by building stub-end terminals just outside the loop. The terminal capacity of the loop could be increased by dividing the present loop into four smaller loops, but presumably there would be public objection to such a plan, because it would involve encumbering more down-town streets with elevated structures, and it is, therefore, not recommended. The ideal solution of the elevated loop problem would be to utilize the loop structure as sections of through routes between the different sections of the city.

PART I.

GENERAL DISCUSSION OF STREET RAILWAY SYSTEMS AND CONDITIONS GOVERNING THEM.

Nearly all of the large cities of the United States are laid out and developed on one of three distinctive plans, each plan requiring a different general system of transportation routes to serve its population.

First.—The *peninsula plan,* with water front on both sides, such as that of New York City and San Francisco.

Second.—The *valley plan,* with a river running through the center, population and business district on both sides of the river, such as Pittsburg.

Third.—The *radiating plan,* with territory on one side of the water front, such as St. Louis, Boston, Brooklyn, and many other cities. To the third plan Chicago belongs.

The peninsula and valley plans usually call for comparatively small street railway track mileage, and great traffic density is found on that mileage, together with large gross earnings per capita served, per mile of track, and per car mile. For example, the elevated and surface transportation systems of New York City, serving a population of 2,050,000, earn about $13 per capita, with a track mileage of 393 miles, and that of San Francisco nearly $14 per capita, with a mileage of 229 miles, serving a population of 350,000.

The radiating plan means greater street railway mileage for the population served, with much smaller gross receipts per capita. The Chicago surface and elevated lines, for example, earn less than $10 per capita on a track mileage of 610 miles, serving a population of two million, and the surface lines of St. Louis hardly $8 per capita on a track mileage of 361 miles, and serving a population of 750,000.

It can be easily seen how different is the transfer problem in a peninsula and valley city from that of a radiating city. In the former there may be a few long through lines with heavy traffic, with many short cross-town feeder lines. The transfers in such a city might mean no additional expense to the company, and little or no complications. In a radiating city, on the contrary, there is a large number of through trunk lines of great length, and many cross-town lines, increasing in length as they are farther removed from the point of radiation. On such a system long rides are granted, and dishonesty in the use of transfers is easily possible, with resultant great loss in earnings to the operating company.

Population and population density have an enormous influence on street railway earnings and profits.

A knowledge of these differences in city plans, and their bearing on the earnings of transportation companies is so absolutely essential to the proper understanding of the theory of conducting transportation, that this brief explanation is deemed advisable.

EFFECT OF DIVISIONAL LINES ON CHICAGO'S DEVELOPMENT.

While Chicago has been classed among those cities laid out on the radiating plan, and, consequently, is one of those cities wherein an ideal system of transportation is difficult of attainment, an added obstacle to such realization is found in the fact that the city is divided into three divisions by the unfortunate course of the Chicago river. From the earliest period in the development of the city down to the present time, this water barrier has been the fixed condition that has been recognized and deferred to. Town governments were established on its lines; it is the boundary line of wards throughout its course; the water, gas and sewerage systems are laid out with reference to it; diagonal streets or avenues to the business center are determined by its course; it is primarily responsible for the congested condition of the business center, limiting as it does, by its movable bridges, the area to a little more than a square mile; the manufacturing district has grown up along its course, and naturally all lines of business that can be more profitably conducted through contact with navigation have sought its frontage,—all of which growth has so increased the value of the dock frontage that the Chicago river, with its movable bridges, must be considered as a permanent and fixed condition,—especially so as the natural dockage of Chicago, the Lake Shore, is being continually and continuously appropriated for park and pleasure purposes. Following out the divisional idea, forty-four years ago, when the city had grown to such proportions that some method of transportation was deemed necessary, street car companies were named, chartered and received grants in divisions, *and to this mistake, made in the infancy of the transportation business, can be traced the primary cause for the present demand for a change in transportation facilities.* Chartering companies and granting privileges by divisions to separate ownership not only saddled upon the people a multiplied system of fares within the limits of the city, but made it impossible to traverse the small area in which the divisions converged, without payment of two fares. To this double fare in the business district can mainly be charged all the extraordinary congested condition not occasioned by the course of the river.

As population increased and additional territory was annexed the owners of the divisional transportation companies were called upon to extend their lines for the accommodation of the increase. Naturally, each division ownership, not being in any manner interested in the operation of any other division, guarded its territory jealously and laid out extensions and new lines with a view to perpetuating the travel in each division over that division's lines to the common center, there to take the lines of the other divisions. When cross *town* lines were inaugurated they were only cross-*division* lines. As the diagonal avenues were laid out with reference to the course of the river, they were confined to some one division, and when they were appropriated by the transportation companies it was only for the acceleration of the movement of the residents of each division to the common center.

As is the case in all cities laid out on the radiating plan, Chicago has a common point where all lines of traffic concentrate and which is the objective point of its population, commonly designated as its business center. This point was fixed and has grown up, by and from the causes outlined above, and must be considered in a large degree as governing the transportation situation.

It is true that as the area of the city grows and population increases, new centers are created at different points in the separate divisions, around which centers population masses, and there is a growing demand for transportation between divisions without reference to the general down-town business center. This demand, which did not exist in the infancy of the city when there was only one business center, will continue to grow as the city grows and as former residents of one division move to other divisions, and carry with them the desire for communication with their former neighbors.

PROBLEMS TO BE SOLVED.

The problems to be solved in relation to transportation facilities for the whole of Chicago and its suburbs are, therefore:

First.—To devise some method of operation which will relieve the congestion of the overcrowded thoroughfares in the central portion, or business district, of the city and tend to render available an increased area in that district.

Second.—To furnish a more ready means of intercourse between the separate divisions of the city, through the business district and outside such district.

Third.—To furnish a means of distributing passengers brought in at the several railroad stations, for transferring them from one station to another, and to facilitate intercourse between different portions of the business center.

It is obvious to the most casual observer that the primary cause for the existing unsatisfactory condition and multiplied fares is found in the diversity of ownership of the corporations charged with furnishing transportation facilities.

A unification of ownership or a consolidation of management on some basis is a condition which must be precedent to any *really satisfactory and lasting solution of the problem,* although an equitable arrangement for the joint use of tracks would effect a temporary solution, and probably result ultimately in unification. Each of the divisional companies has given due attention in the past to the securing of privileges to construct tracks in its own division and in the down-town district—every concession granted tending to perpetuate divisional operation. The idea has taken firm hold on a large proportion of our citizens that Chicago should be one large city, in fact as well as in name, and rapid strides are being made tending in the direction of eliminating the separate Town Governments, taxing bodies, etc. It would seem, therefore, that now is the time to eliminate the divisional lines in its surface transportation facilities, and all other considerations should be subservient to the accomplishment of this one feature, viz: *One fare within the city limits.* Whether this be accomplished by universal transfers between the separate companies at all junction and connecting points, or by the operation of through lines of cars routed over the tracks of the three divisions, is a question of expediency. There should be no difference of opinion as to the latter method suggested being the more desirable. It could be accomplished by a unification of ownership or management of the several companies interested, which would be the best way, or by the joint use of tracks by the separate companies. The same results could be obtained by the transfer method, but with considerable inconvenience to the traveling public and expense to the operating companies, but this method should be adopted in case unification of management or joint use of tracks cannot be effected.

EXISTING DIVERSITY OF OWNERSHIP.

The surface lines serving the city are either owned or operated by eight companies, viz: Chicago City Railway Company, Chicago Union Traction Company, Chicago General Railway Company, Chicago Consolidated Traction Company, South Chicago City Railway Company, Calumet Electric Street Railway Company, Chicago Electric Traction Company and Suburban Railway Company. The mileage of the three former companies is entirely within the city limits. The mileage of the remaining five companies is partly within the city limits and partly in adjoining territory. There are four companies operating elevated railroads, all of which roads operate to the business center and around one common loop, controlled by a fifth company.

It is claimed that a part of the ordinances of the Chicago City Railway Company and of the North Chicago City Railway Company and the Chicago West Division Company (the two latter companies being subsidiary companies of the Chicago Union Traction Company), expire in July, 1903. The ordinances and grants under which the remaining companies are operating do not expire in the near future.

The Chicago City Railway Company serves that portion of the South Division contiguous to the business center, but has no affiliation with or control of the companies serving the outlying southerly territory, although some of their lines are in close connection for easy transfer of passengers. None of the lines of the outlying companies have terminals north of Sixty-third street.

The Chicago Union Traction Company, by virtue of leases, controls the operation of the lines of the North Chicago Street Railroad Company and the West Chicago Street Railroad Company, and their subsidiary companies, viz: the Chicago Passenger

Railway Company, the Chicago West Division Railway Company and the North Chicago City Railway Company.

The West and North Divisions are served by these companies except where the lines of the Chicago Consolidated Traction Company are built through the territory contiguous to the business center and where operating privileges are exchanged between the Union and Consolidated Companies. The Union Traction Company also practically controls the operations of the Chicago Consolidated Traction Company by virtue of an operating agreement and also by control of a majority of its capital stock.

The Chicago Consolidated Traction Company is in possession of ordinances covering a large number of streets which are extensions to streets on which the Union Traction Company is now operating cars and also covering streets that are section and half section lines, within the present city limits, which condition precludes the possibility of future extensions of the Union Traction Company lines to the present city limits or to any extensions thereof. The Chicago Union Traction Company charges one fare of 5 cents and the Chicago Consolidated Traction Company charges another fare.*

The Consolidated Traction Company is also in possession of ordinances covering some streets that traverse the inner territory of the Union Traction Company, and its cars reach a terminal in the business center by traffic agreements with the Union Company, but there is no interchange of transfers on these streets between the two companies. While these two companies are separate and distinct and while the ordinances running to the Consolidated Company do not expire at the present time and consequently are not under consideration, it would be very desirable—if such a thing were possible in the adjustment of the Union Traction Company's ordinances—to eliminate the double fare within the territory at present served by the Union Company and also in the entire territory within the present city limits, served by both the Union and Consolidated Companies. The North Western Elevated Railroad Company is furnishing service to a few favorably located residents contiguous to its line on the last most northerly mile and to those clustered around its terminus, for one fare, while other residents further removed from the elevated line and served by the lines of the Consolidated Traction Company are compelled to pay 10 cents to reach the business center.

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*Since the foregoing was written the Supreme Court of Illinois has handed down a decision confirming the position taken by the city that by the agreement existing between the two companies and by the control of the stock of the Consolidated Company by the Union Company, the two Companies were one, and consequently one fare only must be charged by the two Companies and transfers must be issued between the lines of both Companies to enable a passenger to complete a continuous trip within the city limits for one fare. At the present time the Companies are attempting to comply with this decision, although it is understood that they intend to appeal to the Federal Courts, and since from this it seems that the question is not yet settled I have thought best to leave the discussion here as well as that in Part 2 relating to transfers stand as originally written.

The Lake Street Elevated Railroad serves, with a 5 cent fare, a small district outside of the present city limits in the territory also served by the Consolidated Company, thus giving those residents immediately contiguous to the elevated line a 5 cent fare, while others in the same territory, but not so fortunately located, are compelled to pay 10 cents to reach the business center. It is only a question of time—and that of very short duration—when Chicago, in its rapid growth, will absorb more territory to the North and West, and this seems to be the opportunity to secure for *all* of those prospective citizens the great benefits of a low fare to their objective point, which a *few* of them are now in possession of. The desirability of such a concession cannot be overestimated and it is equally desirable in the territory within the present city limits, *south* of the territory served by the lines of the Chicago City Railway Company and also of the territory adjoining the city limits on the south; but unfortunately the Chicago City Railway Company has no affiliations with or control of the several companies serving that territory and consequently the same vantage points are not in possession of the city, as exist with regard to the territory to the north and west. It might be argued that the much greater distance involved in reaching the southerly suburbs would preclude the possibility of securing a single fare for their residents; but the argument would not hold good in reference to the northerly and westerly suburbs, as an elevated road is already furnishing service for 5 cents to a *portion* of the residents in the very center of the district.

The Chicago General Railway Company's ordinances and leases cover, among other streets, one mile between Twenty-second and Thirty-first streets, on both Kedzie avenue and Ashland avenue. This company has no affiliation with either the Chicago City Railway Company or the Chicago Union Traction

Company, and its occupancy of the streets as above stated precludes the possibility of connecting the trackage of the City Railway Company and of the Union Traction Company, now being operated both north and south of the Chicago General Railway Company's tracks, for the purpose of connecting the West and South Division across the South branch of the river, unless some arrangement is made to secure the trackage of the Chicago General Company, or the right to operate over it.

UNDERLYING IDEAS OF REPORT.

Viewing the situation from the standpoint of the best interests of the whole City of Chicago, these ideas should prevail at all times and be guiding and determining factors in arriving at conclusions, viz: That Chicago is one city, not three; that there are no divisional lines traversing the district embraced within its boundaries; that the citizens have the right to expect and demand that they be transported in, through and about the whole district in one general direction for one fare and with as little inconvenience attendant upon the use of transfers as practicable. With these ruling ideas held firmly in mind, this report has been formulated.

In my opinion, in the adjustment of this transportation question, the amount of cash compensation to be secured by the treasury from the street railways should be of secondary consideration to the attainment of one fare within the city limits and the very best transportation facilities known at the present time, with the guaranteed assurance that the service be kept up to modern standards and that the citizens would receive all the benefits from all future developments of the art.

PART II.

INADEQUACY OF PRESENT TERMINALS AND SERVICE WITH RECOMMENDATIONS FOR IMPROVEMENT UNDER DIVISIONAL OWNERSHIP.

Showing the Present Terminals in the Business Center, the Uses Made of Same, Their Inadequacy.—Reasons for the Inadequate Service Being Furnished at the Present Time. —Reasons for Dead Trackage in the Down-Town District.—How Electric Terminals Were Granted in Business Center.—Reasons Why Cable Operation as a System and Operation of Cars in Trains Should Be Abandoned.—Conclusions as to What Should Be Done to Better Conditions, Under the Present System of Divisional Operation by Separate Managements.—Discussion of the Relative Merits of Overhead and Underground Conduit Types of Electrical Construction.—Recommendations for an Arrangement of Loop Terminals to Take the Place of the Present Terminals.—Recommendations as to the Disposition of the Present Terminals.—Table Showing the Capacity Required of Terminals.—Recommends a System of Routing to Eliminate Largely the Use of Transfers.—Reasons for Desirability of Double Truck Cars.—Teaming Conditions and Their Influence on Car Traffic.—Speed of Cars, Showing Reasons for Not Further Limiting the Speed.—Report on the System of Transfers in Use.—Recommendations for the Building of Additional Tracks to Better Serve the Public.

It is hard for the casual observer to see why good business practice would not prompt the owners and operators of the several street railway properties to operate a sufficient number of cars to adequately accommodate the people if it were possible to do so. It is very evident to the ordinary observer that large numbers of people living within a two-mile limit of the business center are walking morning and night. Some of these walk from choice, but the most of them do not. An observation taken any morning between 7 and 8 o'clock or any evening between 5:30 and 6:30, on any of the principal thoroughfares at a point one mile from Madison and State streets, will demonstrate the correctness of this statement. At the same time it will be observed that *every* car passing the point of observation is loaded to a point where it would be impracticable to take on more passengers.

REASONS FOR PRESENT CONDITIONS.

There are three prime reasons for the present conditions in the business district during rush hours:

First.—The present terminal facilities, as arranged, are utterly inadequate.

Second.—The operation of cars by cable power prohibits the use to their maximum capacity of the terminal facilities that *are* provided.

Third.—The lack of electric power in the business district.

There are now in operation, during the hours of maximum traffic on the lines that enter the business district, 1,379 cars, consisting of:

772 cable cars.
97 electric motors trailed on cable trains.
510 electric cars.

The 869 cable cars and electric cars trailed on cable are operated around five loops.

The 510 electric cars are operated around one loop and on five stub end terminals—34 of them being hauled by horses eight blocks each, every round trip.

In the case of the cable loop serving the Blue Island and Halsted Street Cable lines, three sides of the loop, Van Buren, Dearborn and Adams street, are used jointly by electric cars—the cars running on two sides, Dearborn and Adams streets being electric cars towed by horses.

The North Division Cable loop crosses the Madison and Milwaukee Avenue Cable loop twice on La Salle street and twice on Dearborn street. The West Division Cable runs under the North Division Cable at each of these crossings, necessitating the dropping and picking up of the cable by each train four times in rounding the loop. The distance between the "let-go" and the "pick-up" point in each case is about 50 feet and for that distance the train is running by momentum. As this point where the train is running by momentum is across a street intersection it very frequently occurs that the train is cut off by a team which brings it to a stop at a point where the rope cannot be picked up. It then becomes necessary to push the train to the "pick-up" point by hand. The North Division Cable being over the West Division Cable at these crossing points, it is impossible for a North Division train to run closer to the crossing point than 100 feet, while the West Division train is making a crossing. If it did, the North Division rope would be raised to a point where the West Division grip would cut it, resulting in a tie-up of all the North Division Cable lines for hours.

These crossing points, with the attendant difficulties of operation, materially reduce the capacity of these two loops over what it would be if operated electrically.

The headway on the North Division loop is a train of one grip and two trailers every 40 seconds, or say one car every 20 seconds. The headway on the West Division loop is a train every 53 seconds, or one car every 26½ seconds. With the difficulties of operation it is impracticable to operate more *trains* around these two loops, and as the city ordinances prohibit the operation of more than one grip and two trail cars in one train, it is obvious that the maximum service that can be given on all the North Division Cable lines and on the Milwaukee Avenue and Madison Cable lines of the West Division has been reached.

The loop serving the Blue Island and Halsted Street Cable lines runs on Van Buren, Dearborn, Adams and Franklin streets. Van Buren street is very much congested by team traffic, and having the elevated structure, was picked out as a street on which an overhead trolley wire could be placed. There being such limited facilities for electric cars in the business district, those that *do* exist are utilized to their fullest capacity for electrical operation, which tends to reduce the chance for cable operation via Van Buren street.

There are 54 cable cars and 80 electric cars operating on Van Buren street east of Fifth avenue, giving a headway of less than one car every 20 seconds. The 80 electric cars stub-end at State street and cross back to the west-bound track. Platform gates have to be changed, trolley turned, fenders put up on one end and let down on the other, and the motorman has to change from one end of the car to the other and adjust his controller and reverse handles. At this point the cars also discharge and take on the bulk of their passengers. It is impracticable to operate this stub terminal on a much closer headway than 20 seconds. Should the headway on the cable lines operating on this cable loop be diminished, the headway for the Van Buren and Twelfth Street Electric lines would have to be lengthened.

Over Adams street, passing the Union Depot, are routed the Harrison Street lines, also the Fulton Street line of the Chicago Consolidated Traction Company, terminating at State street. The overhead trolley wire stops at Fifth avenue and the 34 cars operating on the above two lines have to be hauled from Fifth avenue to State street and back by horses. Adams street forms the north side of the Blue Island and Halsted Street Cable loop, and over this street is also operated the 54 cable cars of the two lines. For the past three years it has been no uncommon sight to see Adams street lined with cars as far west as the bridge, awaiting the unloading of stone wagons at the Post Office site. All the incoming Union Depot passengers patronizing these lines desiring to reach State street are liable to be subjected to these delays several times each day. Under the existing conditions it is impracticable to operate more cars on Adams street.

On Madison street, between Clinton and Fifth avenue, are operated the Canalport and Twenty-first Street line and the Taylor Street line, with 16 and 10 cars respectively. The overhead wire ends at Fifth avenue, and in order to give as much benefit as possible from the operation of these cars under the limited trolley wire facilities in the down-town districts, they are taken north on Fifth avenue and Wells street to Kinzie street, forming a pretty fair connection between the Union and Northwestern Depots; but the regular patrons are compelled to walk from Fifth avenue if they desire to reach the shopping district to the east. Horses could be used here to haul the cars over Madison street to State street did not the Madison and Milwaukee cable occupy Madison street under a 26½ second headway.

Lake street from Fifth avenue to Dearborn, and the loop formed by Dearborn, Randolph, State and Lake street tracks, serve as terminal facilities for 169 electric cars operating on Ogden avenue, Division street, Chicago avenue, Grand avenue, Indiana street, Elston avenue and North State street. The headway on this loop and on Lake street, east of Fifth avenue, is less than 20 seconds. Lake street is badly congested with team traffic which is prohibited from leaving the street car tracks by teams standing between the curb and the uprights of the elevated structure, set about two feet outside of the car tracks. Under the existing conditions it is impracticable to operate more cars on Lake street.

Clark street, from Washington street to the river, furnishes terminal facilities for the Larrabee and Sedgwick Street lines, operating 13 and 12 cars respectively, giving a 65 second headway on the terminal. While more cars could be operated on this terminal, it is unfortunately located with reference to the districts for which more electrical terminal capacity is needed. It cannot be used by West Division cars, as those cars cannot reach it owing to the already congested condition of the Lake street tracks west of Clark street. It cannot be reached over any other street *but* Lake street, as no other east and west street, except Van Buren street, has a trolley wire. Forty-six per cent of the North Division business is done on the cable lines and as long as the four principal arteries leading to the North Division, viz: Clybourn avenue, Lincoln avenue, Wells street and North Clark street, are maintained exclusively as cable lines it will be impossible to bring more electric cars to the business center to utilize electrical terminals.

Dearborn street, from Kinzie street to Randolph street, is equipped electrically and is used by the line connecting the Northwestern and Polk Street Depots, and also forms one side of the electric loop serving the lines entering over Lake and North State street. The cars on this depot line are pulled by horses, on Dearborn street between Randolph and Van Buren streets, where an overhead wire is reached on which the cars complete the trip. In traversing Dearborn street between Randolph and Van Buren streets by horse power it very materially interferes with the operation of the North Side Cable lines and the Blue Island and Halsted Street Cable lines.

State street has an overhead wire from the river to Lake street, but as the State Street bridge has been in course of reconstruction for months, this terminal has been useless and the North State street cars have been taken over the Dearborn Street bridge and around the Randolph street electric loop, thus further congesting it. The State street terminal, when in operation, lands its passengers too far north to be popular or of much value.

The Randolph Street bridge has been in process of reconstruction for some time and has consequently been unavailable for street car operation.

The Harrison Street bridge has been condemned for street car operation for a number of years.

Fifth avenue has a trolley wire from the river to Twelfth street, under the elevated structure from Lake street to Van Buren street, but it is principally used by the cars of the Chicago consolidated Traction Company, furnishing transportation between the Northwestern and Grand Central Depots. Fifth avenue is too far west to be of much use as a terminal.

There are only three arteries entering the business district from the South Division, available for street car operation, viz: Wabash avenue, State street and Clark street. Wabash avenue and State street are exclusively for cable use, leaving only Clark street for electrical uses. Over these three streets are routed 638 cars. Wabash avenue has 94 trains and trails 60 Indiana avenue electric cars from Eighteenth street around the Randolph street cable loop, giving a headway of one train every 56 seconds, or one car every 18 seconds.

State street has 89 trains and trails from Archer avenue, 37 Archer avenue electric cars and 53 Ashland avenue electric cars, giving a headway on State street north of Archer avenue and around the Lake street loop of one train every 52 seconds, or one car every 26 seconds.

More cars could be operated around these cable loops if the power houses and ropes would pull them; but owing to the large number of heavy electric motor cars that are trailed, the power houses are at present taxed to their utmost capacity and the life of the cables is reduced to the minimum compatible with practical operation. It must be borne in mind that not only is the electric car much heavier than the cable car, but the motor armatures being geared to the car axles by small pinions on the armature shafts, the armatures must be revolved by the car wheels at a speed largely in excess of the speed of the car wheels, which augmented by the electrical reactions in the motors, materially increases the drawbar pull required to move such a train over what would be required to move an ordinary cable train. In accelerating a cable train to which is attached one of these heavy motor cars, a much firmer hold must be taken of the rope, and as the rope continues to move at its normal speed while the heavier train is accelerating, the wear on the rope is abnormally great. In retarding a cable train to which a motor car is attached, the revolution of the armatures must be retarded as well as the car, and this extra work placed on the braking mechanism of a train is a fruitful source of accidents. Altogether the trailing of motor cars on cable trains is an undesirable method of operation and would not be resorted to if other terminal facilities were available.

Over the Clark street terminal are operated 239 electric cars stub-ending at Washington street. The headway on Clark street north of Twenty-second street is about 26 seconds. The operation of changing ends, adjusting fenders, and turning trolleys, changing gates and crossing over to the south-bound track, has to be gone through with. Passengers have to be discharged and taken on, and it is hardly possible to get out of the switch in the 26 seconds allowed. The fact that the north-bound track is lined with cars bumper to bumper as far south as Twelfth street, almost every evening during the rush hour, is conclusive proof that the operation is not accomplished in 26 seconds. In reaching the Washington street terminus, the congested car traffic on the east and west lines on Van Buren street, Adams street, Monroe street and Madison street, as well as the heavy vehicle traffic on Jackson boulevard, have to be crossed. Under the present conditions it is impracticable to operate more cars on Clark street.

If a loop could be provided for this Clark street traffic. it could be operated much more satisfactorily; but all the streets intersecting Clark street and paralleling it on each side are occupied by tracks of the Union Traction Company.

It must be apparent to anyone who will thoroughly investigate the ruling conditions, that very little improvement can be made in the surface transportation situation unless a radical change is made in such conditions.

THE ELIMINATION OF THE CABLE SYSTEM.

There was a time in the development of Chicago and its transportation business when cable operation seemed to be *all* that could be desired. Ideas on most all subjects are formed through comparison. At the time cables were installed in Chicago, all street cars were operated by horses, and electricity as a motive power was in its most experimental stage. Cable operation was such an improvement on horse operation that every one considered it ideal. Later developments in electrical operation have made it as much more desirable than cable operation as cable operation was to horse operation. Under all installations of cable systems prior to the installation of the Broadway cable in New York, operations of cars in trains was considered the proper method. The single car operation on Broadway, as well as the single car electrical operation demonstrated the superiority of the single car method. Two or more cars operated in a train decreases the *frequency* of cars on the street; increases the number of stops in the ratio that the larger number of passengers on the train bears to the capacity of a single car; requires more time for acceleration and retardation; in taking up the lost motion in drawbar connections due to wear, an extremely unpleasant effect is transmitted to the car; the surge of the slack in the cable communicates a jerky movement to the car; owing to the length of the train and ordinances prohibiting the blocking of crossings by cars, passengers on the forward cars are carried byond the foot path to the sidewalk and are frequently compelled to alight in the mud; the necessity for transmitting signals through one or more hands endangers the safety of the passenger; the added weight of a train over a single car requires greater distance, more time and more power for braking and many collisions and accidents are traceable to train operation that would not happen under single car operation; congestion in crowded thoroughfares is increased through the continuous occupation of space. The foregoing are a few of the disadvantages of train operation. There is nothing to be said in favor of the method, not even from an ownership standpoint. The money saved in drivers' wages is more than dissipated in the accident account. Nearly all of the objectionable features to train operation by cable power, apply to train operation by electric power, and the operation of trailers on electric motors should be discouraged.

Cable operation as a system is objectionable because the movement of a large number of people is entirely dependent on the care of one man, the gripman at the levers. If he fails from any reason to drop the cable at or within 10 feet of a designated spot, the cable sustains damage, which not only delays the passengers on the one train that causes the damage, but completely stops the entire operation of the whole line until the damage is repaired. Under some of the Chicago installations the cable on one street is driven by the cable on another street, so not only is the line on which an accident occurs stopped, but all other dependent lines are stopped.

When cables were introduced in Chicago, naturally the installation was made on streets on which the traffic was the greatest. Having cabled these streets, horse cars had to be eliminated from them or lose the benefits in speed conferred by the cable. This very materially curtailed the elasticity of routing and compelled a much larger usage of transfers. Former horse lines that were routed direct to the business center were transformed into feeder lines for the cable; hence the dead trackage in the business center. When ordinances were secured for the conversion of horse tracks into electric tracks, the right to operate the cable tracks by electric power was withheld and the overhead trolley was prohibited in the down-town district, thus perpetuating the conditions from which the people were already suffering. After several years of most unsatisfactory operation, electric terminal facilities were granted over a few of the horse tracks in the business center, which relieved the situation to some extent *at that time,* but the travel has now outgrown those facilities. At the time the grant was made for these down-town trolley wires, Fifth avenue on the west, Van Buren street on the south and Lake street on the north were established as "dead lines" within which no trolley would be allowed. Later grants permitted wires on Clark street within this district. The above named streets were selected as the boundary lines, as they were already occupied by the elevated structure. The occupancy of these streets by the elevated structure increased the congestion already existing—these streets being natural highways for team traffic—and when the added burden of electric cars was introduced, the congestion became abnormal. All efforts on the part of the Traction Companies and the City Authorities to agree upon an amicable and satisfactory way of electrically equipping the cable and horse lines, and the dead tracks in the business center, in order to furnish terminals for electric cars, have failed up to the present time.

RECOMMENDATIONS.

The foregoing, it seems to me, sets forth the conditions as they exist, and the causes which led up to these conditions have, I believe, been impartially and conservatively stated. Serious conditions require radical treatment, and the following recommendations are respectfully submitted, with a belief that their adoption will give to the citizens of Chicago as good *surface line transportation facilities* as can be given under the separate ownership and operation of territory at present existing:

First.—All cable operation should be abandoned and the cable trackage converted to either overhead trolley or underground conduit for electrical propulsion of cars.

Second.—The territory embraced by the river on the north and west, and Twelfth street on the south should be used in common by all companies for the proper location of loop tracks for terminal facilities, all these business center tracks to be of the underground electric conduit type.

Third.—Cars should be routed, so far as practicable, via trunk, avenue, and cross-town lines combined, in such manner as to serve the maximum amount of travel with the minimum use of transfers.

Fourth.—Sufficient cars of the double truck pattern, equipped with brakes operated by other than hand power, adequately heated during cold weather, and operated singly, should be provided for all through lines, although lighter cars could be used on the cross-town line service.

Fifth.—On all well paved streets all rails on new track built and on all tracks when renewed, should be of the grooved type, designed on such lines that the groove will be cleaned by the passage of the wheel flange and presenting the least obstruction to *crossing* vehicles, and extending the least invitation to *tracking* vehicles. Where such rails are laid the pavement should be kept clean.

To accomplish the first and second recommendations involves, on the part of the Traction Companies, a very large expenditure of money and an abandonment of extensive equipment from which little salvage can be obtained. The expensive part of cable installation is the track, curve and vault construction. The yokes used in a large part of Chicago cable construction were designed for a shallow rail, and to carry the ordinary single truck street car weighing about five tons. They are, therefore, not suitable for the operation of 25 ton double truck electric cars such as are now being operated on South Clark street and on some of the West Side lines. The correctness of this statement is verified by the present condition of the Milwauke avenue cable track, over which only ten-ton motor cars have been in operation for a few years. The abandonment of the cable systems and the substitution of electric tracks means an entire rebuilding of most of the cable trackage. Power house engines and other machinery designed for cable use cannot be utilized to advantage in electrical operation. While this heavy expenditure of money and the abandonment of property by the companies is involved, the effort to obtain for the people adequate and up-to-date transportation facilities is the paramount object to be obtained in the adjustment of the transportation question. An estimate in detail of the cost of building underground conduit electric track is given elsewhere in this report.

RELATIVE MERITS OF OVERHEAD TROLLEY AND CONDUIT SYSTEMS.

Experience with the overhead trolley wire in Chicago, as well as in other large cities, has demonstrated that its advantages far exceed its disadvantages. There is practically no increased danger in its use in the average business or residential districts, except that due to the increased speed of the cars. In these districts the buildings are not of such height as to require the hoisting of long ladders or stand pipes by the fire department in case of fires, and as modernly constructed trolley lines are provided with frequent current cut-out points, very little, if any, danger is experienced from contact with live wires in suppressing fires. There have been very few recorded instances of damage arising from broken or falling wires, and such as have occurred have been more than fully offset by damages sustained by persons and property from the open cable or electric slots in the street surfaces through the catching of horseshoe calks and the dropping in of light vehicle wheels. In congested districts, like the business center of Chicago, where the buildings attain such heights, and where even a lamp post on the sidewalk is an obstruction, pole setting and overhead wires should be prohibited. Outside of this district objections to the overhead trolley are mainly on account of its appearance. While conduit construction is preferable and *should ultimately be required on all densely populated streets* occupied by the railway companies' tracks, its relative importance to the entire transportation problem, and consequently the amount to be constructed now, should be determined by your Honorable Body. It seems to be a question of balancing esthetic considerations against financial ones. *Under any circumstances overhead construction should not be permitted inside of the district bounded by the river on the north and Twelfth street on the south.*

PLANS FOR ROUTING OF CARS AND THE RELATION THERETO OF THE PRESENT TUNNELS.

Map No. 1 shows the present tracks in the district embraced by the river on the north and west and Twelfth street on the south, showing the tracks in use for present terminals and the tracks not in use, or what are commonly known as "dead tracks."

Map No. 2 shows an arrangement of loops, eleven in number, three from the South Division, three from the North Division, and five from the West Division, entirely independent, in which grade crossings are eliminated, except where the traffic operating on each loop crosses itself to avoid running against vehicle traffic, which custom has decreed shall keep to the right. It is impossible to devise loops where one street has to be used for two tracks and also observe the right of team traffic without crossing the car traffic at some point on the loop. It is plain that in making the choice between two evils, viz., the crossing of car traffic, or the running against team traffic, the lesser has been chosen. The crossing of car traffic on the loop cannot be considered as reducing its capacity much more than the crossing of the track at any point by a team. It is plain that this plan furnishes as much terminal capacity as can be obtained in the limited area available on the surface. In this plan the three tunnel entrances now in existence within the business district are incorporated, and it seems to be essential in whatever plan is adopted, either surface or subway, that the present tunnels be lowered in order to provide a deeper channel in the river to maintain marine traffic and retain our present and regain our former marine commerce. If the tunnels are lowered a sufficient amount to accommodate marine traffic the present tunnel entrances must be extended in both directions at least one block, in order that the grades may not become prohibitive for the operation of electric cars. It is obvious that whatever plan of surface terminals may be adopted, which involves the use of and lowering of the present tunnels, must be open to this objection. It therefore seems to me that it is impracticable to lower the present tunnels and retain them for surface street car operation.

Map No. 3 is a modification of the plan shown on Map No. 2 and eliminates the use of the tunnels and provides for through traffic between divisions, but is based upon the assumption that grade crossings will be permitted, and that the two companies could amicably arrange for the joint use of tracks in the business district. La Salle, Washington Street, and Michigan Avenue are left free of tracks, and thus could be utilized for boulevard purposes, or team traffic. This arrangement of terminals serves the largest street mileage by all lines of cars that I have been able to devise, and makes it possible to deliver almost all of the passengers to State Street, and all to Dearborn Street. (For routing of cars under this plan see Appendix D.) By the adoption of this plan, which could be put into operation in a very short time after once agreed upon, the destruction of the present tunnels could at once take place, and thus remove the present barriers to marine traffic, and at the same time leave it possible and practicable to construct whatever system of subways may ultimately be decided upon without the necessity of adhering to the location of the present tunnels. It should not be inferred from this that I advocate the *complete* destruction of all the present tunnels, for it is possible and reasonably certain that one or more of them could be used in a subway system. The tops of such tunnels could be immediately lowered and accommodate marine traffic, and the remainder of the work preserved for future use in connection with the subways. It is feasible to handle the present traffic under this arrangement, for the reason that modern bridges have largely been constructed and are being constructed, and the handling of the river traffic has of late years been controlled in such a manner that interference with street car traffic could be borne with until the subway tunnels could be constructed. It should be thoroughly understood, however, that if any attempt to lower the tunnels is made, they should be lowered a sufficient amount to permanently accommodate the probable marine traffic of the future.

TRAFFIC CONDITIONS.

As showing how near the eleven terminal loops, as given on either map No. 2 or No. 3, would provide facilities for the traffic from the three divisions, the following is submitted.

It was necessary to ascertain what proportion of the total passengers carried by the two companies from the three divisions was carried into the business center during the entire day and during the morning and night "rush," and as their records did not show this information it was necessary to make some assumptions and estimates, which I am convinced are approximately correct.

It was ascertained that 20 per cent of the total passengers carried were carried on cross lines, lines not having a terminal in the business center. Deducting this 20 per cent, left the passengers carried on trunk lines terminating down town. From this number was deducted 25 per cent for those passengers riding on trunk lines but not coming to the business center. This left the number of passengers that were brought into and taken out of the business center on trunk lines during the entire day. As the present service given during the middle of the day is less than 50 per cent of the maximum service during the rush hours, and as the cars during the middle of the day are only moderately well filled, a deduction of 25 per cent was made to arrive at the number of passengers hauled during the rush hours. The rush hours are embraced within 90 minutes in the evening and a somewhat longer period in the morning, but for the purpose of this estimate it is assumed that the intervals are equal. By dividing the number thus obtained by two, we have the number for which capacity must be provided during ninety minutes each morning and evening. By a further deduction of one-third, the number handled in one hour is obtained.

	1901.	One Year Ending June 30, 1902.		1 Year.
	South Div.	North Div.	West Div.	Total.
Passengers carried	117,127,732	56,807,083	99,329,815	273,264,630
Cross Town, 20 per cent	23 425,546	11,361,416	19,865,963	54,652,925
Trunk Lines	93,702,186	54,445,667	79,463,852	218,611,705
25 per cent. Short Rides	23,425,546	11,361 416	19,865,963	54,652,925
75 per cent. of Trunk Lines to down town	70,276,640	34,084,251	59,597,889	163,958,780
25 per cent. ride during day	17,569,160	8,521 062	14 899 472	40,989,695
Hauled during rush morning and night	52,707,480	25,563,189	44,698 417	122,969,085
Per day	144,404	70.036	122 461	336,901
One-half morning	72 202	35 018	61 230	168,450
One-half at night to be moved in 90 minutes	72.202	35.018	61,231	168,451
To be moved per hour, two-thirds	48 135	23,346	40,821	112,302

The hourly capacity of a loop under a given headway is the carrying capacity of the number of cars that pass a given point on the loop in one hour.

Assuming 60 passengers to the car which would be a comfortable load for a double-truck car, a

30	second headway would give,	120	cars, Capacity	1	loop per hr	7,200 ps.
25	" " " "	144	" "	1	" "	8,640 "
20	" " " "	180	" "	1	" "	10,800 "
12	" " " "	240	" "	1	" "	14,400 "
10	" " " "	360	" "	1	" "	21,600 "

The three loops provided for the South Division would give,

Under a	30	second headway, capacity for	21.600	per hour
" "	25	" " " "	25 920	" "
" "	20	" " " "	32 400	" "
" "	15	" " " "	43 200	" "
" "	10	" " " "	64.800	" "

The number of passengers to be handled per hour on these three loops from the South Division, as shown by the foregoing table, is 48,135, or it would be necessary to maintain a little closer headway than 15 seconds, assuming an equal number of passengers carried in a given time night and morning. In case more passengers were carried at night, the headway would be slightly decreased during this time.

The five loops provided for the West Division would give,

Under a 30 second headway, capacity for 36,000 per hour
" " 25 " " " " 43,200 " "
" " 20 " " " " 54,000 " "
" " 15 " " " " 72,000 " "
" " 10 " " " " 108,000 " "

As the number of passengers to be handled per hour from the West Division is 40,821, only a 25-second headway would be required, leaving room for considerable increase in business over the present, and also for the use of South Division cars, which could, by arrangement with the Union Traction Company, be brought into the business center via Halsted and Van Buren streets.

The three loops provided for the North Division would give the same capacity as the three South Division loops. The number of passengers to be handled per hour from the North Division is 23,346. The operation of the loops under a 25-second headway would be required to handle this number, leaving considerable room for increase in business, and room for some of the cars from the northwest portion of the city to be routed through the North Division.

ROUTING OF CARS TO AVOID TRANSFERS.

Map No. 4 shows the present routing of cars on all of the streets.

Map No. 8 shows a system of routing, which, if used on a portion of the streets, it is believed will accommodate the traveling public much better than the present system and eliminate largely the use of transfers, if the passengers will exercise a little care and forethought in selecting the proper car.

For Example. Milwaukee Avenue traverses the northerly portion of the West Division, and is a main diagonal highway intersecting east and west and north and south streets on which lines of street railway are at present operated. Instead of compelling all passengers originating on these intersecting lines to transfer in order to reach their destination, cars should be routed as follows:

Route 1.—From the business center, via Milwaukee Avenue, west on Chicago Avenue to West Fortieth Avenue.

Route 2.—Via Milwaukee Avenue, west on Division Street to California Avenue.

Route 3.—Via Milwaukee Avenue, west on North Avenue to West Forty-Sixth Avenue.

Route 4.—Via Milwaukee Avenue, west on Armitage Avenue to West Forty-Fourth Avenue.

Route 5.—Via Milwaukee Avenue to city limits.

If each of these routes were operated on a five minute headway, the intervals between cars on Milwaukee Avenue would be:

South of Chicago Avenue, one minute.
Between Chicago Avenue and Division Street, two minutes.
Between Division Street and North Avenue, three minutes.
Between North Avenue and Armitage Avenue, four minutes.
North of Armitage Avenue to the city limits, five minutes.

Decreasing in frequency of cars as outlying districts were reached.

The headway on the intersecting east and west streets from the operation of the Milwaukee Avenue cars would be five minutes on each street, but this headway would be lessened by *through* cars constantly operating on the east and west streets.

Second Example. From the business center.

Route 1.—Via Wells Street, west on Chicago Avenue to Milwaukee Avenue.

Route 2.—Via Wells Street, west on Division Street to Milwaukee Avenue.

Route 3.—Via Wells Street, Clybourn Avenue and west on North Avenue to Milwaukee Avenue.

Route 4.—Via Wells Street, Clybourn Avenue and west on Fullerton Avenue to Milwaukee Avenue.

Route 5.—Via Wells Street, Clybourn Avenue and west on Belmont Avenue to Milwaukee Avenue.

The objection will probably be raised by the street railroad companies that this method of routing will tend to create confusion and increase the cost of operation, and there might be foundation for such an argument when the system is first adopted, but for the great benefit of the traveling public this method should be tried for the reason that it largely eliminates the necessity of transfers and reduces the time required for through trips. The system is in successful use in other large cities which are laid out similar to Chicago. This method of routing could be extended to other streets with equal benefits to the public, but all of these changes should be made gradually, and as the utility of such routing became evident. In fact, this branch of the transportation business should be under the control of the city, to be extended to districts as the residents of such districts expressed themselves in favor of it.

The method adopted in routing cars has a great bearing on the efficiency of service rendered to the public. It will be readily seen that the benefits to be derived from a more comprehensive method of routing than is in effect at the present time cannot be derived until all tracks are equipped for the operation of one system of motive power.

TYPES OF CARS COMPARED.

The installation of double-truck closed cars is very desirable for a number of reasons. The seating capacity of a double-truck car with reversible back, cross seats and center aisle, such as is being operated on South Clark Street, is 52 passengers, against 30 passengers for the ordinary closed single-truck car, or an increase of 22 passengers per car, or 73 per cent. The change to double-truck closed cars, of all the single-truck closed cars now being operated, would add a seating capacity equivalent to adding 1,122 more cars of the single-truck type to the present service, without increasing the number of cars on the streets. A car equipped with cross seats and reversible backs permits all passengers to face forward, and consequently can be used with lowered windows and open doors, as a summer car. Milwaukee, Wisconsin, has adopted for use for the entire year such a car, recognizing the fact that there are more days in the so-called summer season, in this climate, calling for closed cars than there are when open cars are more desirable. The riding qualities of a double-truck car are superior to the oscillating single-truck car. While the double-truck car is much heavier than the single-truck car, requiring more power for its operation, it can be operated at a higher average speed with greater safety to the public than the lighter single-truck car can, owing to the application and use of power-braking mechanism, without which mechanism no heavy double-truck cars should be permitted to operate.

It would be advisable to continue the operation of the small type of single-truck cars on short cross-town lines, and also in the business center, provided a local business center distributing system is installed. While on the subject of cars, I desire to say that, in the event of the installation of a subway system in Chicágo, cars for operation in the subways should be constructed of non-combustible material. Safety to human life demands that this precaution be taken with electrically operated cars in confined places. The subject is receiving attention in this country as well as abroad, and the result of the investigations will undoubtedly be a decision to eventually demand non-combustible cars for operation in all under ground ways.

In the operation of double-truck cars there will be found a number of points on the different streets and at intersections where the present tracks are too close, and where curves are not of the proper radius to operate with safety. At these points the tracks should be changed so that the safety of the public would be guarded at all times.

A discussion on type of rail and track construction will be found in Part 6 of this report.

OBSTRUCTION BY TEAM TRAFFIC.

Should all of the foregoing recommendations be adopted, the traveling public will not receive the measure of efficient service calculated to be rendered, unless the municipal authorities adopt and stringently enforce regulations for the better conduct of team traffic on the streets of the city. In no first-class city in the country are the conveniences of the traveling public so little consulted and their rights so little protected as in Chicago. While one of the city ordinances provides that teams shall leave the track on the approach of the car, it is qualified by the provision, "as soon as possible," and the teamster, in the absence of a police officer, is the sole judge of when it is possible. In the judgment of the average teamster the possibility of leaving the track decreases in ratio to the weight of the load, generally resulting, if he has a heavy load, in his retaining the track until he reaches an intersecting street.

As there is practically no limit on the weight of load, heavy loads are the rule, and as heavy loads prohibit any degree of speed, street car operation on all of the principal arteries of the city is seriously retarded.

Another source of delay is due to the fact that in many cases wagons hauling heavy loads are loaded to their full level-road, or street car track, capacity, with the result that when these wagons reach the slight grades approaching the bridges the horses cannot pull the loads up the grades and onto the bridges. It has, therefore, become customary for the drivers of such wagons to count upon being pushed up these grades by the electric cars, and they wait at these approaches until the cars come to their assistance, and as the wagon must be removed from the track before the car can proceed the operators of the car are compelled to assist the wagons, thus enforcing upon the street car companies the extra expense for power furnished, and the still greater important point to the companies and the public of additional delay in traffic. This practice has become so common that push-bars, or poles, are kept at the principal bridge approaches for the purpose of enabling the wagons to be pushed up the grades by the cars.

A number of streets are so narrow that a wagon cannot be placed with its rear wheels against the curb and at right angle thereto, without blocking the car track. It is a daily occurrence throughout the entire city that wagons assume this position and occupy from five to ten minutes unloading, while cars are lining up, very much to the inconvenience and exasperation of the passengers. By thus locating his wagon, the unloading is somewhat facilitated for the one teamster, but hundreds of street-car passengers are discommoded and frequently large loss is entailed. Provision should be made for the uninterrupted operation of cars. An ordinance should be enacted, with a heavy penalty for its violation, compelling teamsters to leave the car tracks immediately upon receiving a signal from an approaching car, and prohibiting the standing of a wagon in any position on the street where it will blockade the car tracks.

The average schedule time of all electric cars operated in the city is 8 22-100 miles per hour, or one mile in seven minutes and eighteen seconds, and when it is considered that this schedule time is only two and one-quarter miles per hour greater than the schedule time maintained under horse-car operation, it will be seen how small are the benefits now received in the line of rapid transit from the adoption of electricity as a motive power.

In establishing schedules, the necessary time for stops, gathered from experience in the operation of each line, is calculated, and an allowance is made for delays incident to ordinary team traffic. Schedules vary on the different streets according to the nature of the district traversed. A speed of not over 11 miles per hour is required between stops to maintain the time schedules, unless delays are encountered from wagons, unloading or holding the track. In such cases, in order to maintain the schedule, it is necessary to increase the speed between stops, or decline to stop, or if the line of cars terminates at a barn, run out extra cars to take the place of delayed cars. Observation will demonstrate that this is a continuous operation at most of the barns. Any effort on the part of the city to curtail the present speed of cars by ordinance will result in a lengthening of schedules, which would materially decrease the already very small benefits in rapid transit derived from electrical operation.

All efforts should be directed to removing the *causes for* delay by regulating team traffic, so that it would not be necessary to attain a higher maximum speed than 11 miles per hour in order to maintain the present schedules.

THE QUESTION OF TRANSFERS.

I have made a very thorough investigation of the transfer problem, and I find that the Chicago City Railway Company is giving transfers within its territory in every conceivable combination that could within reason be demanded. It is not only giving transfers from trunk to lateral lines and vice versa, but is issuing transfers *upon* transfers to facilitate the movement of passengers for one fare. With a few exceptions the same may be said of the Union Traction Company within the territory of the West Division and within the territory comprising the North Division.* The Union Traction Company is also issuing transfers between the two divisions, enabling the West Division residents to reach the North Division, and vice versa, over some of the outlying lines. They are not issuing transfers at the junction of their divisional lines in the business center, and consequently it requires two fares to establish communication between the territories east of Halsted Street in the West Division and south of Chicago Avenue in the North Division. There are also some points of intersection and juncture west and north of these boundaries where transfers could be given that would facilitate movement. Transfers are exchanged at a few points in the

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Since the foregoing was written the Supreme Court of Illinois has handed down a decision sustaining the right of the city to pass ordinances regulating the issuing of transfers, and since such decision was rendered the Union Traction Company has been attempting to issue transfers in accordance with ordinances heretofore passed, but not previously recognized by the said company. The company is now issuing transfers between lines centering in the business district, and the Union and Consolidated Companies are now exchanging transfers, thus enabling a passenger to complete a continuous trip in one direction between the West and North Divisions and within the confines of either division over the lines of each or both companies for one fare. It is understood that the company intends to appeal to the federal courts.

North Division between the Union Traction Company and the Chicago Consolidated Company, but only at points where the Consolidated Company is utilizing trackage belonging to the Union Traction Company and vice versa.

For the convenience of the traveling public, it would be very desirable to bring about a universal system of transfers between the lines of these two companies, not only within the present city limits, but covering the lines of the Consolidated Company that go beyond the city limits, and the following discussion regarding transfers should be considered as relating only to the present situation with divisional ownership. The extreme distance that a passenger would be hauled under this transfer would not be over 12 miles, and that only possible on three lines, and the territory outside of the present city limits now served will in all probability soon be annexed. There has been a great deal of misapprehension on the question as to what should be considered as constituting a universal transfer within a single fare district. A large number of people hold the idea that under a universal transfer system, they should be permitted to choose their own routes and receive transfers at all points of intersection or juncture, permitting them to ride in any direction they choose for one fare. To this misapprehension is due a great deal of the misunderstanding that seems to exist between the people and street railways in general. A universal transfer within a one-fare district should be considered, as discussed later on Page 109, to be a continuous ride in one general direction over the shortest distance between two points within the one-fare district. A street railway that attempted to issue transfers under any other course of reasoning would soon lose a very large percentage of its receipts, to which it is justly entitled, through the improper use of transfers by the public. A great deal has been written and said on the question of transfers. At best they are a nuisance to both the public and the company, and everything that it is practicable to do should be done to eliminate them.

NEW TRACKS RECOMMENDED.

Map No. 7 shows the distribution of population, shaded to show density. From this map it is apparent that certain districts are not very well served with surface transportation lines. Future extensions should be made with a view to serving these districts. Additional tracks should also be built to connect the tracks already laid on north and south streets, so as to either exchange transfers between companies or route cars through.

The following are recommended as being desirable for construction in the near future:

Indiana Avenue from Eighteenth Street to Twelfth Street.

Twelfth Street from Indiana Avenue to State Street.

Indiana Avenue from Fifty-First Street to Sixty-Third Street.

St. Lawrence Avenue from Forty-Third to Fifty-First Streets.

Fiftieth Street from Indiana Avenue to Cottage Grove Avenue.

Forty-Third Street from State Street to Halsted Street.

St. Lawrence Avenue from Sixty-Sixth to Sixty-Third Streets.

South Park Avenue from Sixty-Third to Fifty-Sixth Streets.

Fifty-Sixth Street from South Park Avenue to State Street.

Western Avenue from Archer Avenue to the South Branch of the Chicago River.

Kedzie Avenue from Thirty-Eighth Street to the South Branch of the Chicago River.

Forty-Third Street from Ashland Avenue to Archer Avenue.

Thirty-Fifth Street from Cottage Grove Avenue to right-of-way of the Illinois Central Railroad.

Thirty-Ninth Street from Cottage Grove Avenue to the right-of-way of the Illinois Central Railroad.

Forty-Seventh Street from Kedzie Avenue to Archer Avenue.

Western Avenue from Blue Island Avenue to the River.

Western Avenue from Elston Avenue to Lawrence Avenue.

Robey Street from Eighteenth to Fourteenth Streets.

Robey Street from Fullerton Avenue to Belmont Avenue.

Robey Street from Sixty-Ninth Street to Blue Island Avenue.

Robey Street from Roscoe Street to Irving Park Boulevard.

Clybourn Place from Ashland Avenue to Elston Avenue.

Armitage Avenue from Milwaukee Avenue to Racine Avenue.

Addison Street from Milwaukee Avenue to Halsted Street.

Colorado Avenue from Hamlin Avenue to Forty-Eighth Avenue.

Chicago Avenue from Fortieth Avenue to Forty-Eighth Avenue.

Fullerton Avenue from Milwaukee Avenue to Forty-Fourth Avenue.

Diversey Avenue, or parallel street, from Elston Avenue to Forty-Fourth Avenue.

Kedzie Avenue from Chicago Avenue to Elston Avenue.

California Avenue from Chicago Avenue to Twenty-Sixth Street.

Fortieth Avenue from Twenty-Sixth Street to Ogden Avenue.

Fortieth Avenue from Washington Boulevard to Grand Avenue.

Fortieth Avenue from North Avenue to Elston Avenue.

Center Avenue from Forty-Seventh Street to Twenty-First Street.

The tracks on Fifty-First Street between Indiana Avenue and Grand Boulevard should be taken up.

In addition to the above streets there should ultimately be built a line from Cottage Grove Avenue to Lake Avenue, between Forty-Seventh and Fifty-Fifth Streets; a line connecting Washington Park and Jackson Park between Fifty-Fifth and Sixty-First Streets, and a line south from Forty-Seventh Street to Sixty-Third Street, approximately parallel to the Illinois Central Railroad Company's right-of-way.

PART III.

GROWTH OF POPULATION AND DEVELOPMENT OF THE TRANSPORTATION BUSINESS, WITH A DISCUSSION OF PROBABLE FUTURE INCREASE, AND AN ANALYSIS OF CAPITALIZATION AND FINANCIAL RESULTS OBTAINED IN PAST OPERATION.

Showing Population by Divisions in Tables and Graphically for Ten Years from 1892 to 1901.—Giving Percentages of Increase and Decrease.—Track Mileage and Population Per Mile of Track.—Revenue Passengers Carried, by Divisions.—Rides Per Capita Per Annum.—Passengers Carried Per Mile of Track.—Gross Passenger Receipts Per Year, Per Mile of Track Per Year, and Per Car Mile Operated Per Year.—Tentative Conclusions Regarding Future Population of Chicago and Probable Future Earnings of Railway Companies.—Statement of Operations for Last Fiscal Year and Analysis of Existing Capitalization.

To show the city's growth and the development of the transportation business the following tables are submitted.

The tables and diagrams on transportation results do not include the business of the Chicago Consolidated Traction Company, as I was unable to secure their figures. As the business of the Company is partly derived from the territory outside the city limits any figures that might have been secured would not have been applicable to the present calculations, it was decided to leave them out of the tables and make approximations as to the business done by that Company within the city limits in the deductions and conclusions to be drawn from these statistics.

Table No. 1—shown graphically in Figure 1—shows the

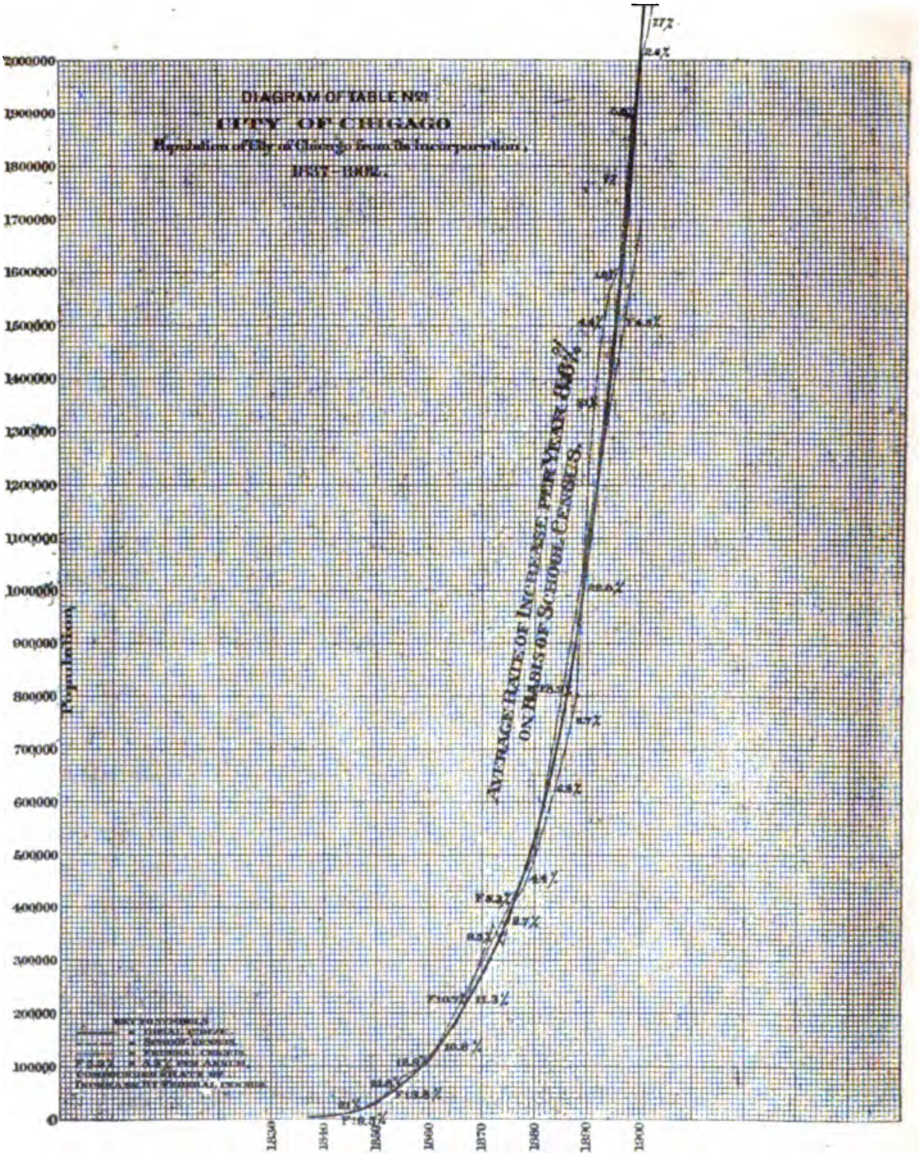
DIAGRAM OF TABLE No. 1
CITY OF CHICAGO
Population of City of Chicago from its Incorporation,
1837-1902.
AVERAGE RATE OF INCREASE PER YEAR 4.6%
ON BASIS OF SCHOOL CENSUS.
Population
2000000
1900000
1800000
1700000
1600000
1500000
1400000
1300000
1200000
1100000
1000000
900000
800000
700000
600000
500000
400000
300000
200000
100000
0
1830
1840
1850
1860
1870
1880
1890
1900

FIGURE 1.

population from the incorporation of the city to the last census, taken in 1900, by Board of Education.

TABLE NO. 1.

Population of City of Chicago from Its Incorporation, 1837, to 1900.

1837	4,170	1860	109,206	1882	560,693
1840	4,479	1862	138,186	1884	629,985
1843	7,580	1864	169,353	1886	703,817
1845	12,088	1865	178,492	1888	802,651
1846	14,169	1866	200,418	1890	1,208,669
1847	16,859	1868	252,054	1892	1,438,010
1848	20,023	1870	306,605	1894	1,567,657
1849	23,047	1872	367,396	1896	1,616,635
1850	29,963	1874	325,408	1898	1,851,588
1853	59,130	1876	407,661	1900	2,007,695
1855	80,000	1878	436,731		
1856	84,113	1880	491,516		

Table No. 2, not shown graphically, gives the population for 20 years from 1880 to 1900 in periods of two years, by Divisions, showing the percentage of increase between each census, by Divisions and as a whole. The 10 years from 1880 to 1890 covers the period of extensive annexation, especially to the South Division. The 10 years from 1890 to 1900 shows an increase from natural growth of 65.3 per cent, or an average of 6.53 per cent per annum, not compounded, and 5.5 per cent compounded, the largest increase being in the South Division. The federal census shows this increase to be an average of 5.44 per cent per annum, not compounded, and 5.35 per cent compounded. The six years from 1894 to 1900 shows an increase of 28 per cent, an average, not compounded, of 4.66 per cent per year, or 4.29 per cent per year compounded, and largely in the West Division. The two years from April, 1898, to April, 1900, shows an increase of 8.44 per cent, or an average of 4.22 per cent per annum, not compounded, and 3 per cent compounded.

TABLE NO. 2.

Population of the City of Chicago by Divisions, 1880 to 1890.

Year.	So. Div.	Percent Increase.	No. Div.	Percent Increase.	W. Div.	Percent Increase.	Total.	Percent Increase.
1880	122,032		99,513		269,971		491,516	
1882	135,648	11.16	112,358	12.90	312,687	15.83	560,693	14.08
1884	149,564	10.26	128,490	14.36	351,931	12.55	629,985	12.36
1886	172,379	15.25	138,533	7.81	392,905	11.64	703,817	11.72
1888	194,164	12.64	154,220	11.32	454,267	15.62	802,651	14.04
1890	413,922	113.18	238,764	54.82	555,983	22.39	1,208,669	50.58
1892	515,736	24.59	276,846	15.95	645,428	16.09	1,438,010	19.00
1894	562,980	9.16	308,212	11.33	696,465	7.91	1,567,657	8.93
1896	585,298	3.96	297,092	*3.60	734,245	5.43	1,616,635	3.12
1898	680,527	16.27	326,817	10.00	844,244	14.98	1,851,588	14.54
1900	725,691	6.63	343,321	5.05	938,883	11.21	2,007,695	8.43

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* Decrease.

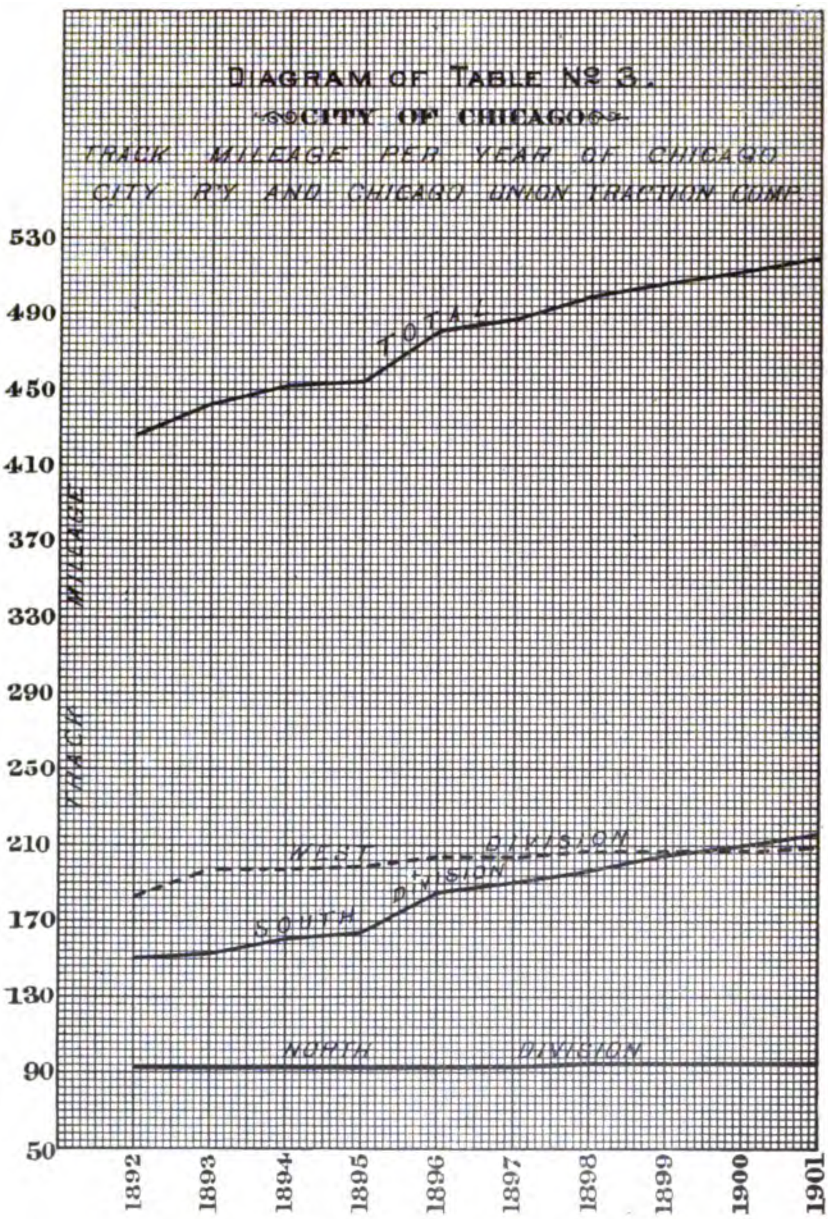
DIAGRAM OF TABLE No 3.
CITY OF CHICAGO
TRACK MILEAGE PER YEAR OF CHICAGO CITY R'Y AND CHICAGO UNION TRACTION COMP.
TRACK MILEAGE
530
490
450
410
370
330
290
250
210
170
130
90
50
TOTAL
WEST DIVISION
SOUTH DIVISION
NORTH DIVISION
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901

FIGURE 2.

PERCENTAGE OF INCREASE IN POPULATION.

	So. Div. Percent.	No. Div. Percent.	W. Div. Percent.	Total. Percent.
10 years, 1880 to 1890	239.18	139.93	105,94	145.90
10 years, 1890 to 1900	75.32	43.79	68.87	66.11
4 years, 1890 to 1894	36.01	29.09	25.27	29.70
6 years, 1894 to 1900	28.90	11.39	34.80	28.07
2 years, 1898 to 1900	6.63	5.05	11.21	8.43

Table No. 3—shown graphically in Figure 2—gives the average single track mileage of surface lines in each Division, and as a whole, for each year from 1892 to 1901, showing the increase year by year to meet the demands of the increase in population. In this mileage is included only the trackage of the Chicago City Railway Company and the Union Traction Company.

TABLE NO. 3.

Track Mileage Each Year from 1892 to 1901—Surface Lines.

Year.	So. Div.	No. Div.	W. Div.	Total.
1892	150.21	93.45	182.90	426.56
1893	152.33	93.45	197.10	442.88
1894	161.62	93.45	197.90	452.97
1895	162.37	93.45	199.00	454.82
1896	184.22	93.45	203.40	481.07
1897	189.72	93.45	203.40	486.57
1898	196.85	94.08	207.30	498.23
1899	205.48	94.08	207.30	506.86
1900	209.82	94.08	207.30	511.20
1901	214.77	94.14	209.20	518.11

Table No. 4—shown graphically in Figure 3—gives the population per mile of surface track, and shows 1,000 more to the mile in the West Division than the South. The North Division is also in excess of the South.

TABLE NO. 4.

Population Per Mile of Track—Surface Lines.

Year.	So. Div.	No. Div.	W. Div	Total.
1892	3433	2962	3529	3371
1894	3483	3298	3519	3468
1896	3177	3179	3609	3360
1898	3457	3474	4072	3716
1900	3459	3649	4529	3927

Table No. 5—shown graphically in Figure 4—gives the Revenue Passengers carried per year from 1892 to 1901 by the surface lines in Divisions. It is interesting to note how the effects of "Boom" and depressed times and competition of Elevated lines

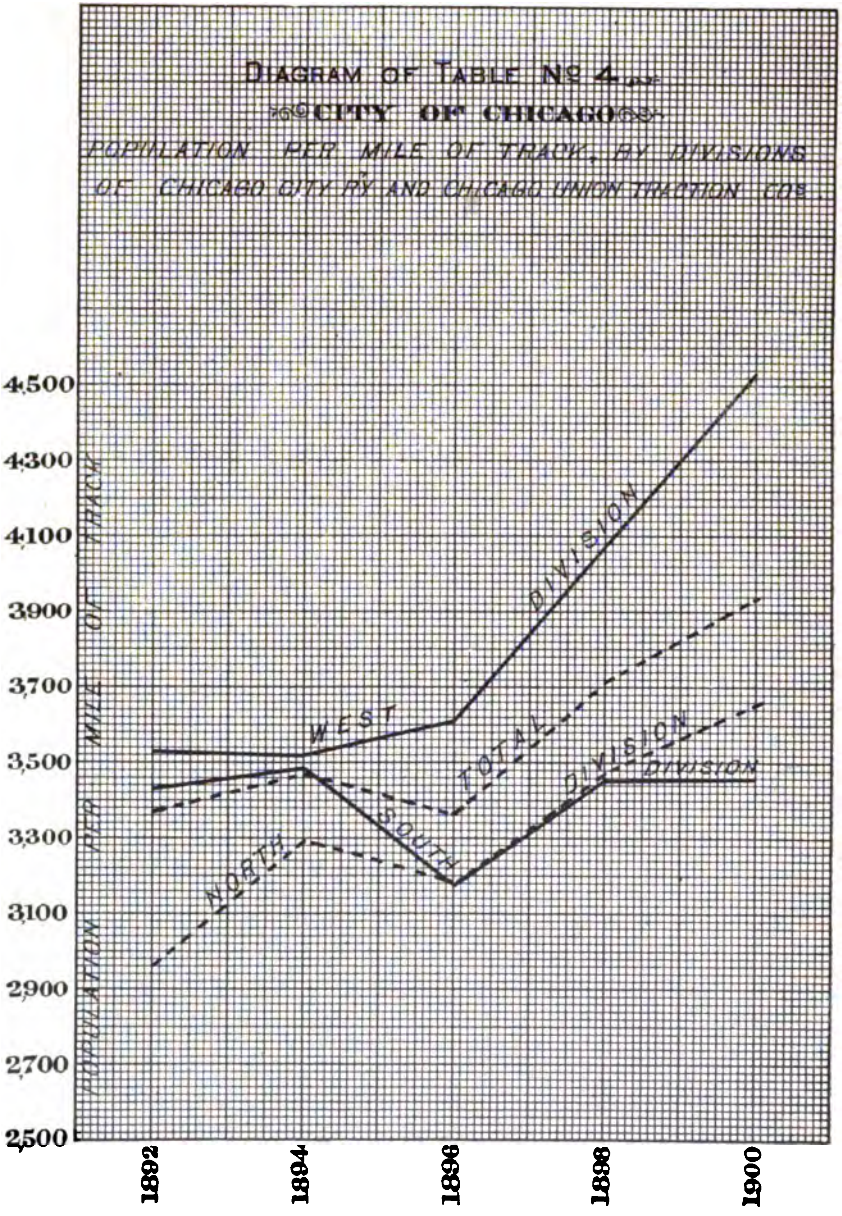
DIAGRAM OF TABLE Nº 4
CITY OF CHICAGO
POPULATION PER MILE OF TRACK, BY DIVISIONS OF CHICAGO CITY RY AND CHICAGO UNION TRACTION COS.
POPULATION PER MILE OF TRACK
4,500
4,300
4,100
3,900
3,700
3,500
3,300
3,100
2,900
2,700
2,500
WEST DIVISION
TOTAL
DIVISION
SOUTH DIVISION
NORTH DIVISION
1892
1894
1896
1898
1900

FIGURE 3.

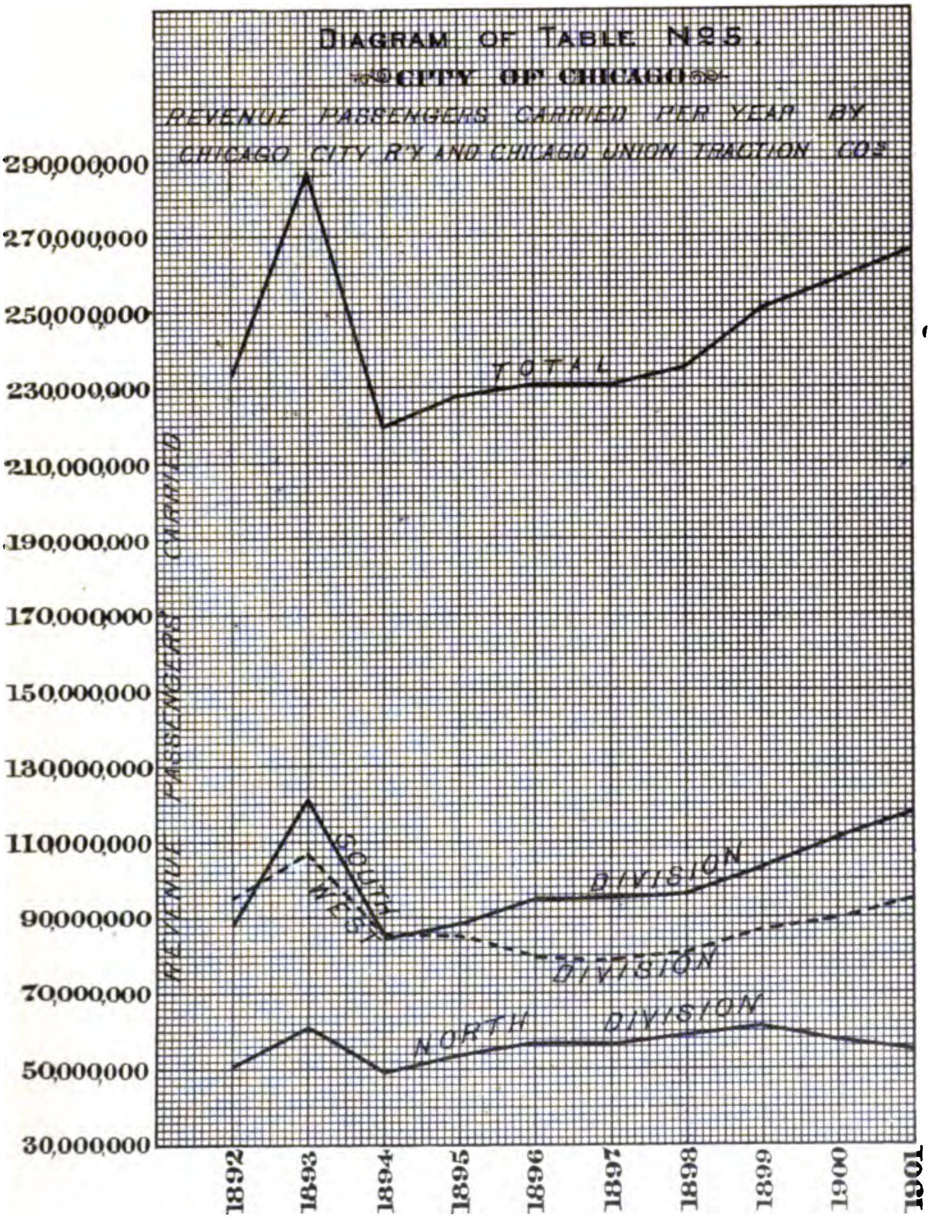
DIAGRAM OF TABLE No. 5.
CITY OF CHICAGO
REVENUE PASSENGERS CARRIED PER YEAR BY
CHICAGO CITY R'Y AND CHICAGO UNION TRACTION CO'S
REVENUE PASSENGERS CARRIED
TOTAL
SOUTH
WEST
DIVISION
DIVISION
NORTH DIVISION
290,000,000
270,000,000
250,000,000
230,000,000
210,000,000
190,000,000
170,000,000
150,000,000
130,000,000
110000000
90000000
70,000,000
50,000,000
30,000,000
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901

FIGURE 4.

can be traced in the operations of the surface transportation business. The returns of 1893 show the benefits derived from the World's Fair. 1894 and 1895 show the depressed times following the Fair and the advent of Elevated competition on the South Side. 1895 and 1896 demonstrate the effects of Elevated competition in the West Division as well as the loss entailed from labor troubles during that period. 1900 and 1901 indicate the operation of the Elevated in the North Division. As there has been no disturbing element introduced in the South Division since the labor difficulties of 1896 and 1897 a steady increase in business is noted, resulting in an increase in 1901 of nearly thirty million passengers over those carried in 1892. The North Division shows an increase of less than five million during the same period and the West Division has only just regained its losses since 1892. Nearly the whole total increase in the city during the past ten years has gone to the Chicago City Railway Company in the South Division.

As is shown in Table 3 and the discussion of Table 9, the increase in mileage in the North and West Divisions, exclusive of about 28 miles, has not been built by the Union Traction Company, and consequently the normal increase in receipts which would naturally accrue to new mileage has not accrued to the Union Traction Company, but has accrued to the Chicago Consolidated Traction Company, which Company built the increased mileage that now exists in the North and West Divisions over that of 1892, exclusive of the 28 miles built by the Union Traction Company. While the foregoing statement that the increase in the last ten years in the North Division is only five million passengers, and that the West Division has only just regained its losses since 1892, is true as to the lines of the Union Traction Company, it is not true when applied to all of the surface transportation facilities of the North and West Divisions.

The Elevated competition in the South Division has not been as serious as in the other divisions, nor is it of as recent date, and consequently it is natural that the increase in the North and West Divisions, even including the increase that has accrued to the additional mileage of the Chicago Consolidated Traction Company, has not been as great as in the South Division, but I believe that the time has arrived when the surface lines have overcome the effect of the competition of the Elevated lines, and that in the future the percentage of increase will be as great in the North and West Divisions as in the South Division.

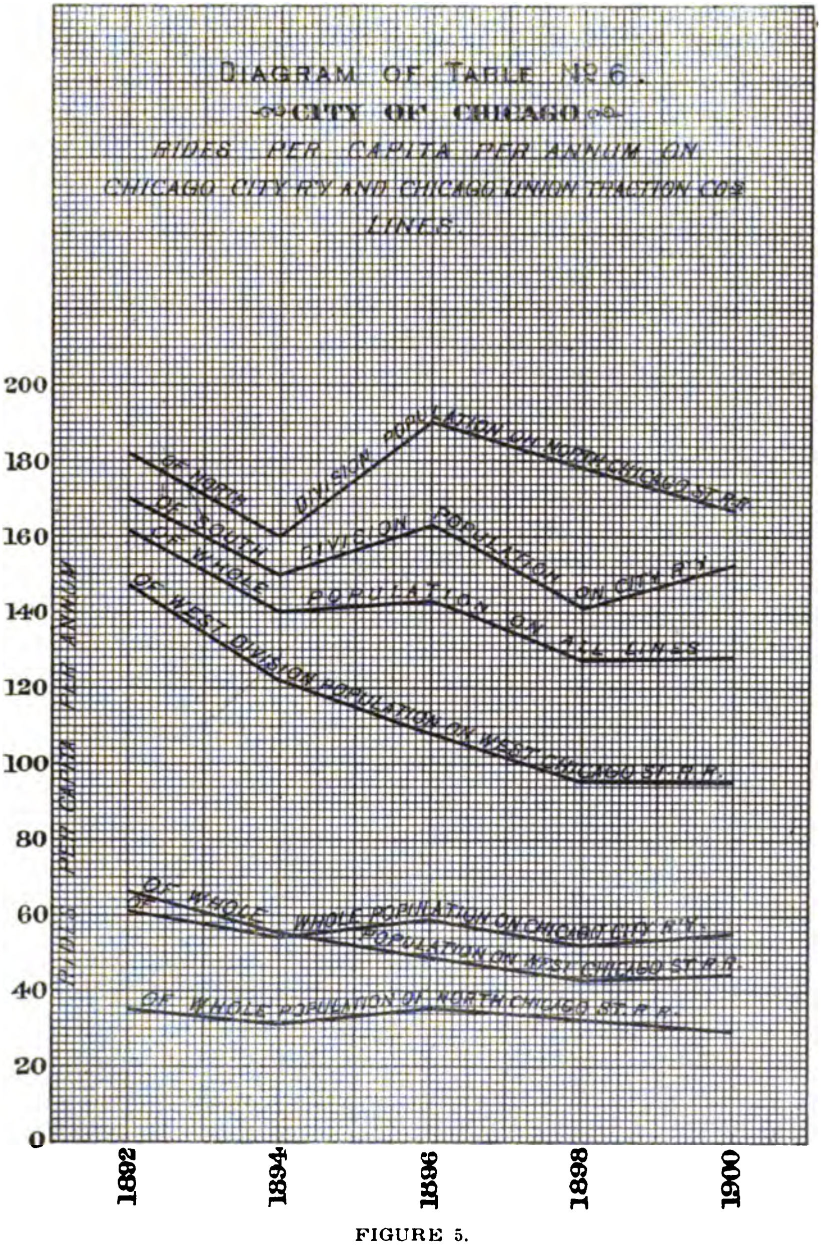
DIAGRAM OF TABLE No 6.
CITY OF CHICAGO
RIDES PER CAPITA PER ANNUM ON
CHICAGO CITY R'Y AND CHICAGO UNION TRACTION CO'S
LINES.
OF NORTH DIVISION POPULATION ON NORTH CHICAGO ST. R.R.
OF SOUTH DIVISION POPULATION ON CITY R'Y
OF WHOLE POPULATION ON ALL LINES
OF WEST DIVISION POPULATION ON WEST CHICAGO ST. R.R.
OF WHOLE POPULATION ON CHICAGO CITY R'Y.
OF WHOLE POPULATION ON WEST CHICAGO ST. R.R.
OF WHOLE POPULATION ON NORTH CHICAGO ST. R.R.
RIDES PER CAPITA PER ANNUM
200
180
160
140
120
100
80
60
40
20
0
1892
1894
1896
1898
1900

FIGURE 5.

TABLE NO. 5.

Revenue Passengers Carried Per Year 1892 to 1901—Surface Lines.

Year.	So. Div.	No. Div.	W. Div.	Total.
1892	88,018,861	50,419,457	94,518,474	232,956,792
1893	120,596,270	60,311,673	107,053,461	287,961,404
1894	84,794,987	49,571,463	85,287,302	219,653,752
1895	88,806,461	53,887,428	85,100,643	227,794,532
1896	95,238,915	56,523,620	79,072,902	230,835,437
1897	95,621,112	56,354,147	78,594,930	230,570,189
1898	95,992,114	58,422,070	80,600,505	235,014,689
1899	103,253,300	61,047,316	86,233,880	250,534,496
1900	110,843,202	57,468,053	89,817,809	258,129,064
1901	117,127,732	55,026,732	94,681,270	266,835,734

Table No. 6—shown graphically in Figure 5—gives the rides per Capita per Annum of the population of each Division on the lines of the Divisional systems; the rides per Capita of the whole population on each Divisional system and the rides per Capita of the whole population on the whole mileage.

This table shows that although the population has increased 39 per cent in the last eight years the rides per Capita have decreased from 162 to 128, the largest falling off being in the West Division. This is due to Elevated competition and the fact that the increase in population has, largely, settled in remote outlying districts, using other means of transportation. The figures also show that the population of the West Division do not ride in proportion to the population of either of the other Divisions.

TABLE No. 6.

Rides per capita per annum—Surface Lines.

	Chicago City Ry. Co.		No. Chicago St. R. R. Co.		W. Chicago St. R. R. Co.		All.
Year.	South Div. Population.	Whole Pop.	No. Division Population.	Whole Pop.	West Div. Population.	Whole Pop.	Whole Popul.
1892	170	61	182	35	147	66	162
1894	150	54	160	31	122	55	140
1896	163	59	190	35	108	49	143
1898	141	52	178	32	95	43	127
1900	152	55	167	29	95	44	128

Table No. 7—shown graphically in Figure 6—gives the Passengers carried per Mile of Track, demonstrating the same point as Table 6.

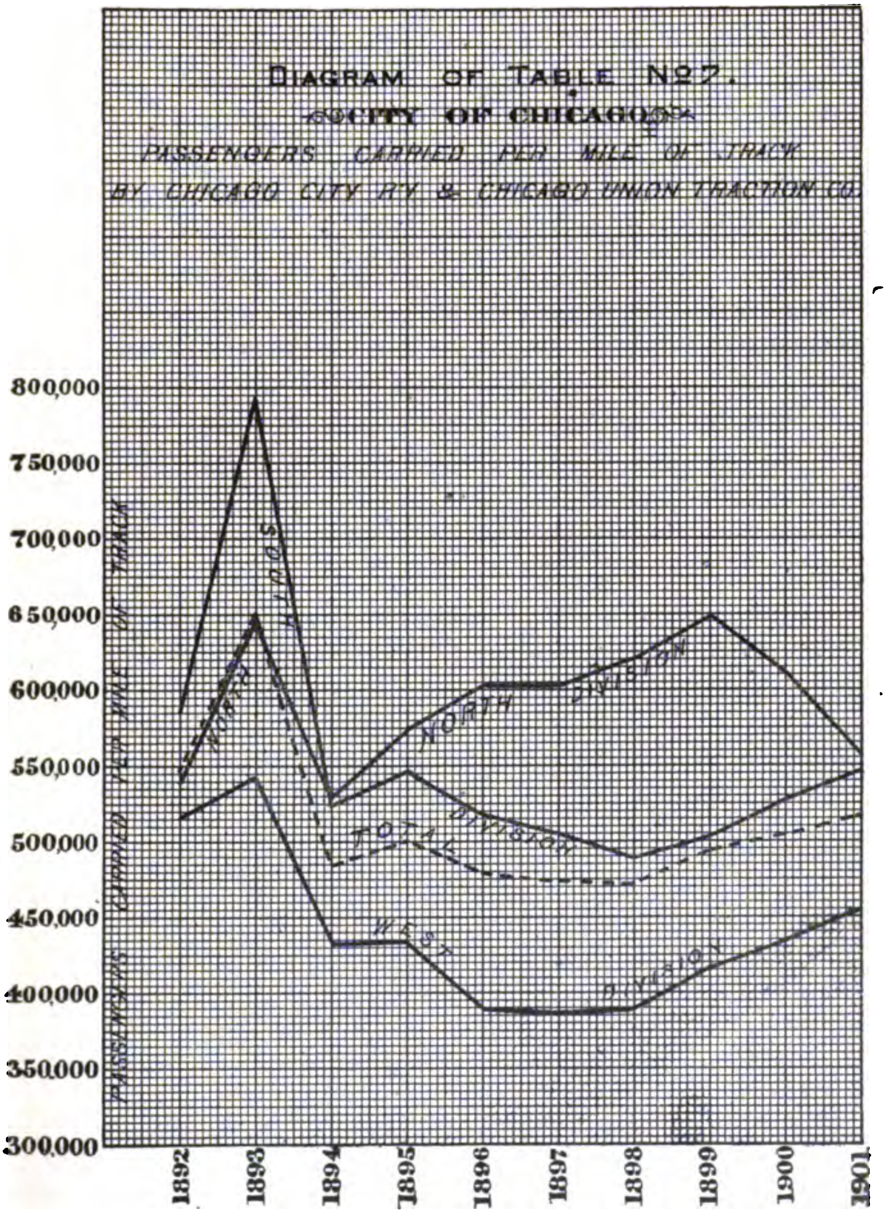
DIAGRAM OF TABLE No 7.
CITY OF CHICAGO
PASSENGERS CARRIED PER MILE OF TRACK
BY CHICAGO CITY RY & CHICAGO UNION TRACTION CO.
800,000
750,000
700,000
650,000
600,000
550,000
500,000
450,000
400,000
350,000
300,000
PASSENGERS CARRIED PER MILE OF TRACK
NORTH
SOUTH
NORTH DIVISION
DIVISION
TOTAL
WEST
DIVISION
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901

FIGURE 6.

TABLE NO .7.

Passengers Carried Per Mile of Track—Surface Lines.

Year.	So. Div.	No. Div.	W. Div.	Average.
1892	585,972	539,533	516,777	546,129
1893	791,677	645,389	543,143	650,202
1894	524,656	530,459	430,962	484,919
1895	546,939	576,644	427,641	500,845
1896	516,984	604,854	388,755	479,838
1897	504,012	603,040	386,405	473,868
1898	487,640	620,983	388,810	471,700
1899	502,500	648,887	416,000	494,287
1900	528,277	610,842	433,274	504,947
1901	545,363	555,043	452,587	515,017

Table No. 8—shown graphically in Figure 7—gives the gross Passenger Receipts per year for the past ten years in Divisions.

TABLE NO. 8.

Gross Passenger Receipts Per Year 1892 to 1901—Surface Lines.

Year.	So. Div.	No. Div.	W. Div.	Total.
1892	$4,400,942	$2,521,511	$4,585,237	$11,507,690
1893	6,059,989	3,014,789	5,196,173	14,270,951
1894	4,264,618	2,479,813	4,142,453	10,886,884
1895	4,476,824	2,694,359	4,157,237	11,328,420
1896	4,808,866	2,826,800	3,973,895	11,609,561
1897	4,816,516	2,818,399	3,848,611	11,483,526
1898	4,832,806	2,921,425	3,987,460	11,732,691
1899	5,194,439	3,051,140	4,281,427	12,527,006
1900	5,543,180	2,876,659	4,487,162	12,907,001
1001	5,856,386	2,750,744	4,730,606	13,337,736

Table No. 9—shown graphically in Figure 8—gives the Gross Receipts per mile of track per year for the past ten years in Divisions. The track mileage in all three Divisions has increased during the past ten years about 92 miles. Of this 64 miles is in the South Division, less than one mile in the North Division and 26 miles in the West Division.

The small increase in mileage in the North and West Divisions by the Union Traction Company and its subsidiary companies is due to the fact that the Chicago Consolidated Traction Company has built some 90 miles within the two Divisions during the past ten years which were used to serve the increasing population.

While nearly all the increased receipts of the whole city during the past ten years is shown to be in the South Division, owing to the increase in mileage the receipts per mile have decreased about $2,000. There being no increase in mileage in the North Division, the whole increase creditable to that Division is represented in the increase of $2,150 per mile of track. As

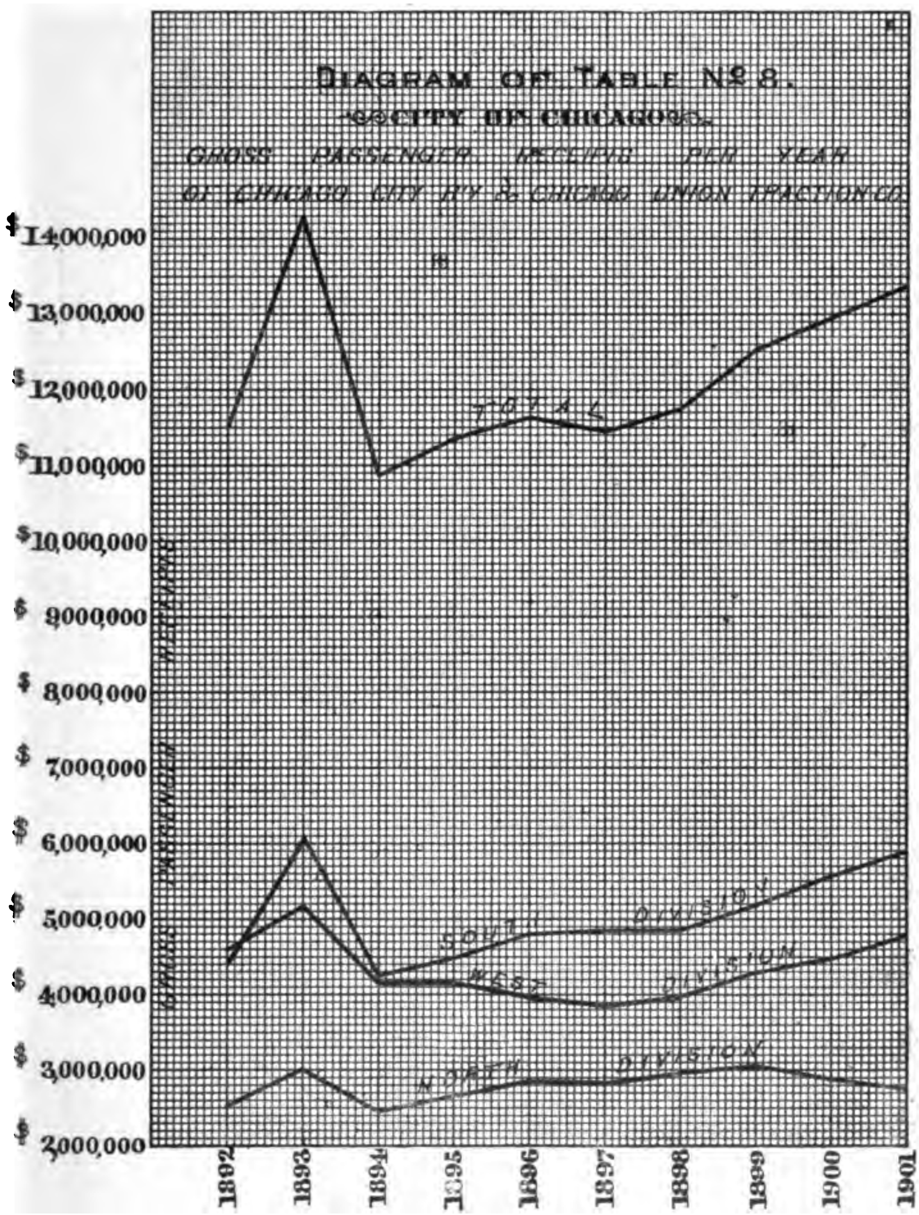
DIAGRAM OF TABLE No 8.
CITY OF CHICAGO.
GROSS PASSENGER RECEIPTS PER YEAR
OF CHICAGO CITY RY & CHICAGO UNION TRACTION CO.
GROSS PASSENGER RECEIPTS
TOTAL
SOUTH DIVISION
WEST DIVISION
NORTH DIVISION
$14,000,000
$13,000,000
$12,000,000
$11,000,000
$10,000,000
$9000,000
$8,000,000
$7,000,000
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901

FIGURE 7.

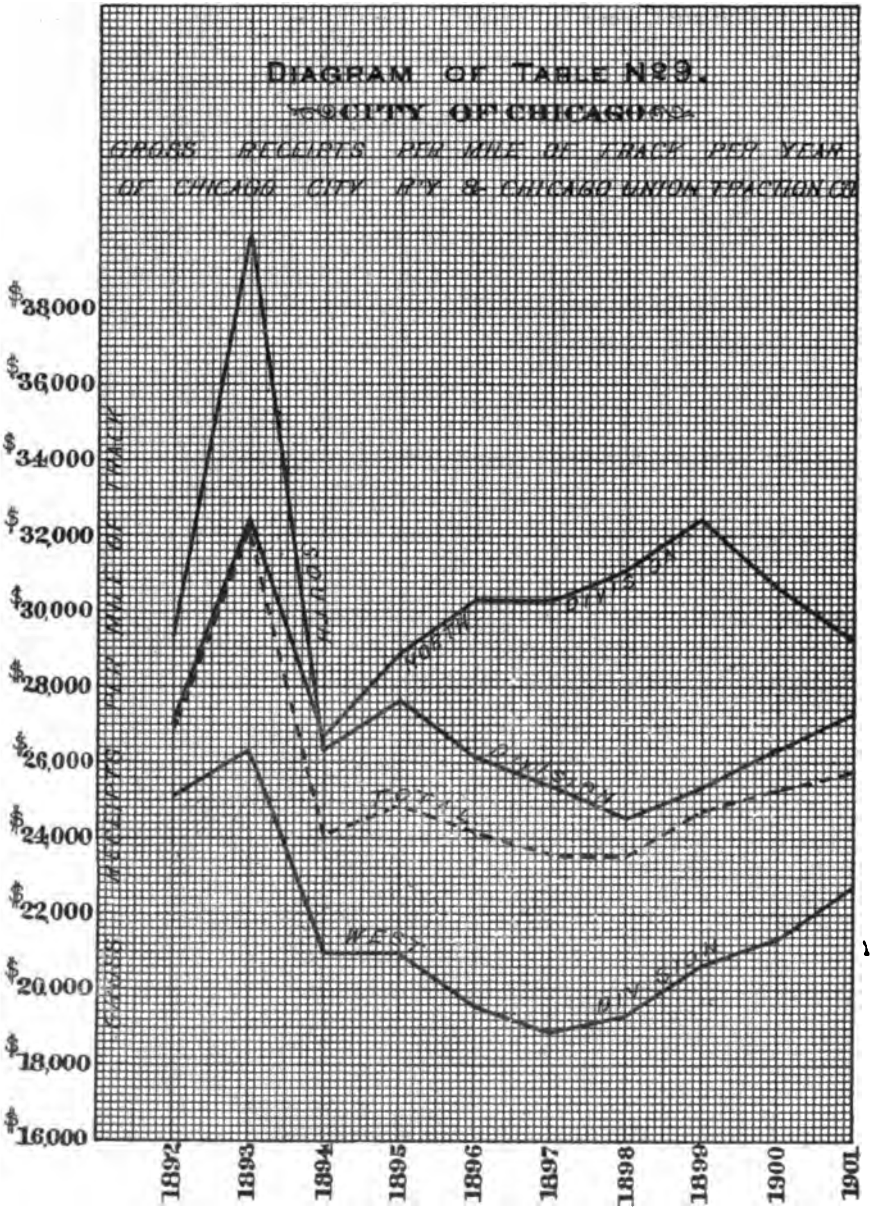
DIAGRAM OF TABLE No. 3.
CITY OF CHICAGO
GROSS RECEIPTS PER MILE OF TRACK PER YEAR
OF CHICAGO CITY R'Y & CHICAGO UNION TRACTION CO.
GROSS RECEIPTS PER MILE OF TRACK
$38,000
$36,000
$34,000
$32,000
$30,000
$28,000
$26,000
$24,000
$22,000
$20,000
$18,000
$16,000
SOUTH
NORTH DIVISION
DIVISION
TOTAL
WEST DIVISION
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901

FIGURE 8.

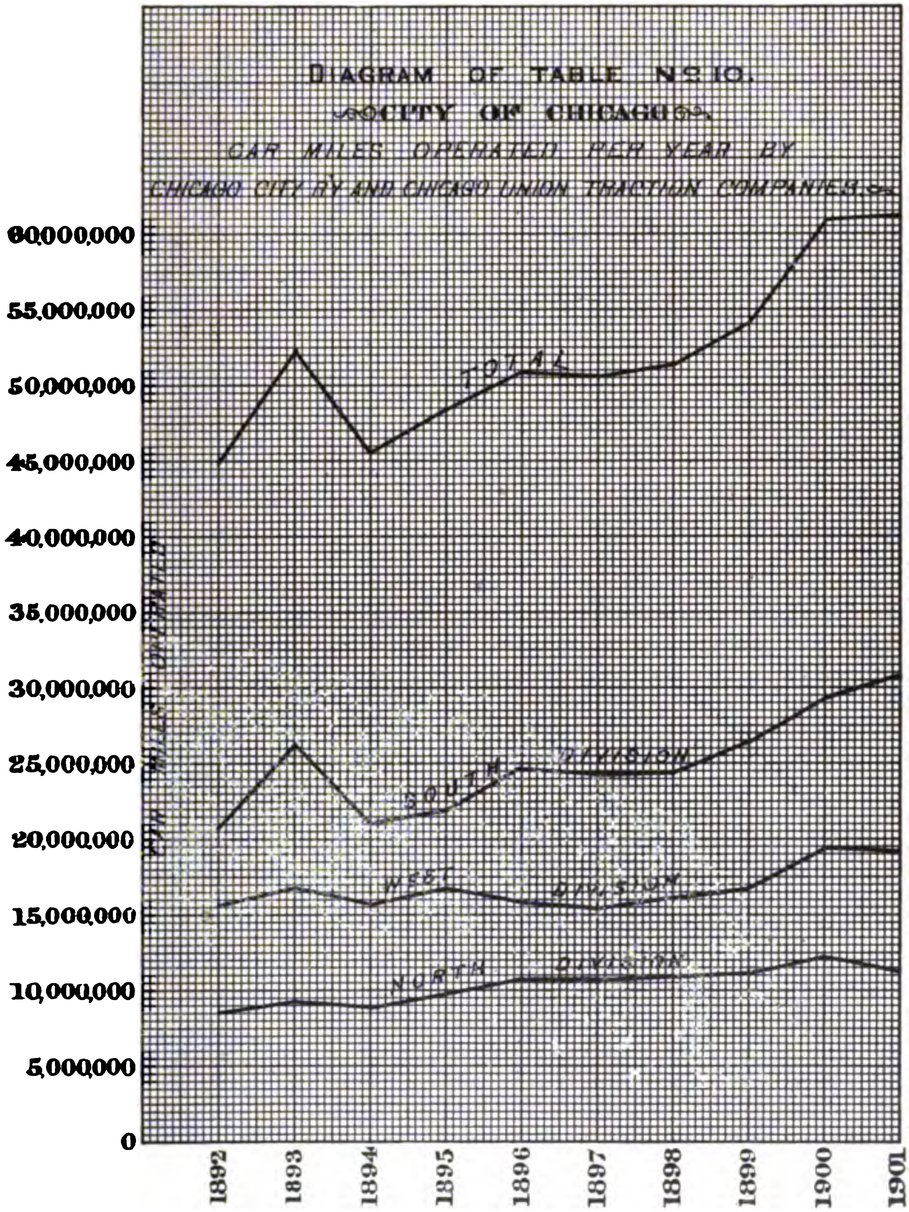
DIAGRAM OF TABLE No 10.
CITY OF CHICAGO.
CAR MILES OPERATED PER YEAR BY
CHICAGO CITY RY AND CHICAGO UNION TRACTION COMPANIES.
TOTAL
SOUTH DIVISION
WEST DIVISION
NORTH DIVISION
CAR MILES OPERATED
60,000,000
55,000,000
50,000,000
45,000,000
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901

FIGURE 9.

there is no increase in receipts per year in the West Division since 1892 with an increase in track mileage of 26 miles, the receipts per mile of track show a decrease of about $2,400.

TABLE NO. 9.

Gross Receipts Per Mile of Track Per Year—Surface Lines.

Year.	So. Div.	No. Div.	W. Div.	Average.
1892	$29,339	$27,133	$25,055	$26,950
1893	39,868	32,417	26,376	32,214
1894	26,324	26,664	20,921	24,033
1895	27,635	28,961	20,922	24,898
1896	26,135	30,396	19,575	24,136
1897	25,350	30,305	18,958	23,580
1898	24,532	31,079	19,205	23,559
1899	25,338	32,459	20,683	24,709
1900	26,396	30,602	21,267	25,258
1901	27,239	29,263	22,634	25,748

Table No. 10—shown graphically in Figure 9—gives the Car Miles operated per year by Divisions for the past ten years.

TABLE NO. 10.

Car Miles Operated Per Year 1892 to 1901—Surface Lines.

Year.	So. Div.	No. Div.	W. Div.	Total.
1892	20,820,710	8,547,791	15,582,142	44,950,643
1893	26,304,090	9,224,173	16,813,135	52,341,398
1894	21,047,410	8,793,587	15,671,500	45,512,497
1895	21,941,900	9,697,326	16,820,525	48,459,751
1896	24,552,900	10,590,036	15,703,761	50,846,697
1897	24,378,000	10,644,270	15,478,263	50,500,533
1898	24.385,300	10,916,737	16,066,454	51,368,491
1899	26,371,000	11,189,758	16,618,244	54,179,002
1900	29,232,360	12,343,787	19,328,434	60,904,581
1901	30,643,250	11,372,043	19,105,342	61,120,635

Table No. 11—shown graphically in Figure 10—gives the Car Miles operated per Mile of Track per year in Divisions for the past ten years.

TABLE NO. 11.

Car Miles Operated Per Mile of Track Per Year 1802 to 1901—Surface Lines.

Year.	So. Div.	No. Div.	W. Div.	Average.
1892	138,805	91,911	85,148	105,270
1893	173,053	99,184	85,346	118,152
1894	129,922	94,554	79,149	100,469
1895	135,444	104,272	84,525	106,505
1896	133.439	113,871	77,358	105,710
1897	128,305	114,454	76,247	103,697
1898	123,783	116,135	77,615	103,150
1899	128,640	119,040	80,281	106,861
1900	139,201	131,317	93,374	119,187
1901	142,527	120,979	91,413	118.000

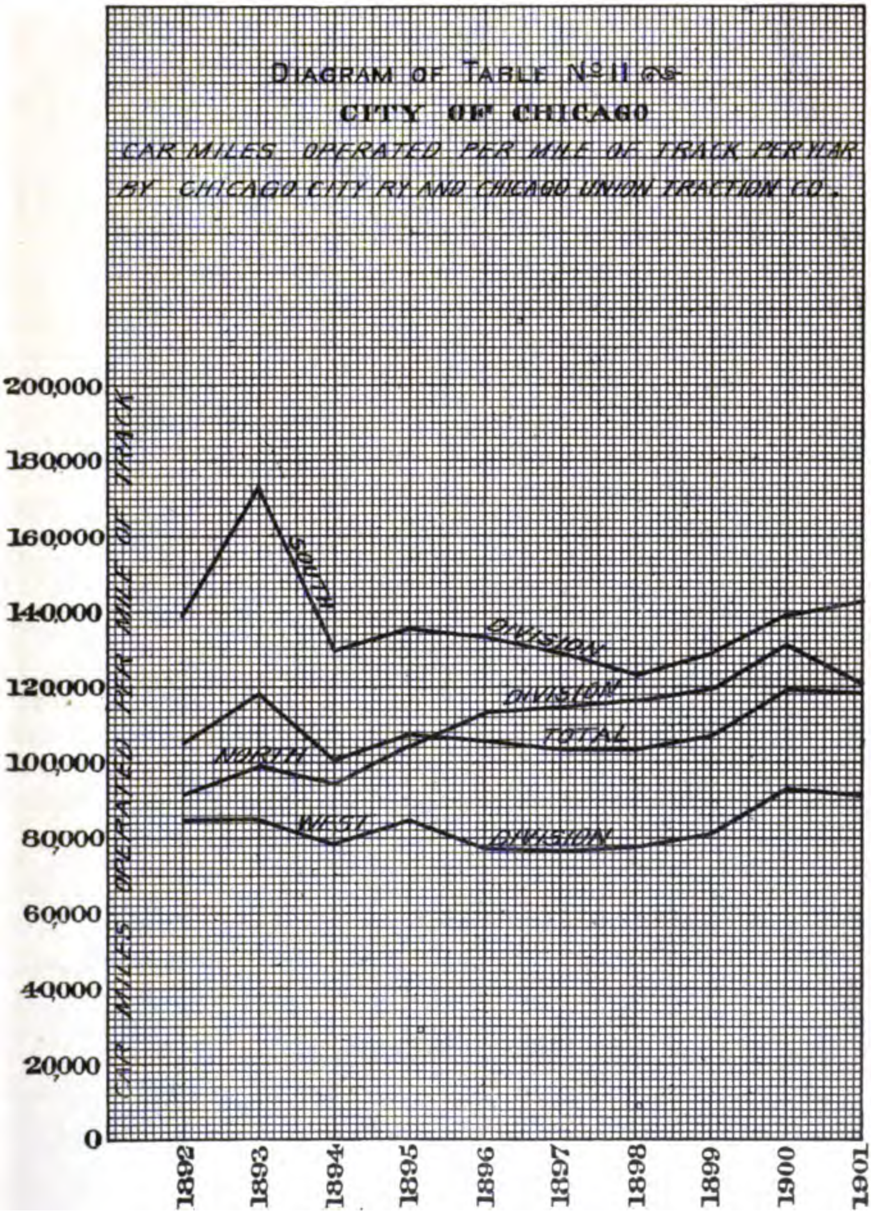
DIAGRAM OF TABLE No. 11
CITY OF CHICAGO
CAR MILES OPERATED PER MILE OF TRACK PER YEAR
BY CHICAGO CITY RY AND CHICAGO UNION TRACTION CO.
CAR MILES OPERATED PER MILE OF TRACK
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
SOUTH
DIVISION
NORTH
DIVISION
TOTAL
WEST
DIVISION
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901

FIGURE 10.

Table No. 12—shown graphically in Figure 11—gives the Gross Receipts per mile operated per year in Divisions for the past ten years.

TABLE NO. 12.

Gross Receipts Per Mile Operated Per Year—Surface Lines.

Year.	So. Div. Rcpts. Per Mile Cents.	No. Div. Rcpts. Per Mile Cents.	W. Div. Rcpts. Per Mile Cents.	Total. Rcpts. Per Mile Cents.
1892	21.13	29.50	29.43	25.60
1893	23.04	32.68	30.90	27.27
1894	20.26	28.19	26.43	23.92
1895	20.40	27.78	24.71	23.38
1896	19.58	26.69	25.30	22.83
1897	19.76	26.48	24.86	22.74
1898	19.82	26.76	24.76	22.84
1899	19.69	27.26	25.76	23.12
1900	18.96	23.30	23.21	21.19
1901	19.11	24.19	24.76	21.82

These last three tables demonstrate that the South Division system is compelled to run more mileage to secure its business than either of the other Divisions. This is due to the elongated shape of the territory, with consequent long routes, and the settlement of the population at points further removed from the business center than in the other Divisions. It will be noted that more mileage has been run in the North and West Divisions since the acquisition of those systems by the Union Traction Company, which means that a more liberal service has been given. The constantly decreasing receipts per mile run, as shown in Table 12, demonstrates that a more liberal policy in the furnishing of accommodations has been adopted each year and the increase in receipts per mile run in the North and West Divisions over the South Divisions is mainly attributable to the fact of there being a more dense population adjacent to the business center, requiring shorter hauls.

Table 13—shown graphically in Figure 12—gives the Revenue Passengers carried per year by the Elevated lines.

Table 14—shown graphically in Figures 13 and 14—gives the Revenue Passengers carried per year from 1892 to 1901 on the Surface and Elevated lines combined, and the percentage of increase each year. This table more satisfactorily shows the steady and uniform increase in the total transportation business each year, combining, as it does, the competing systems. During the nine years from 1892 to 1901 the total increase has been 55.58 per

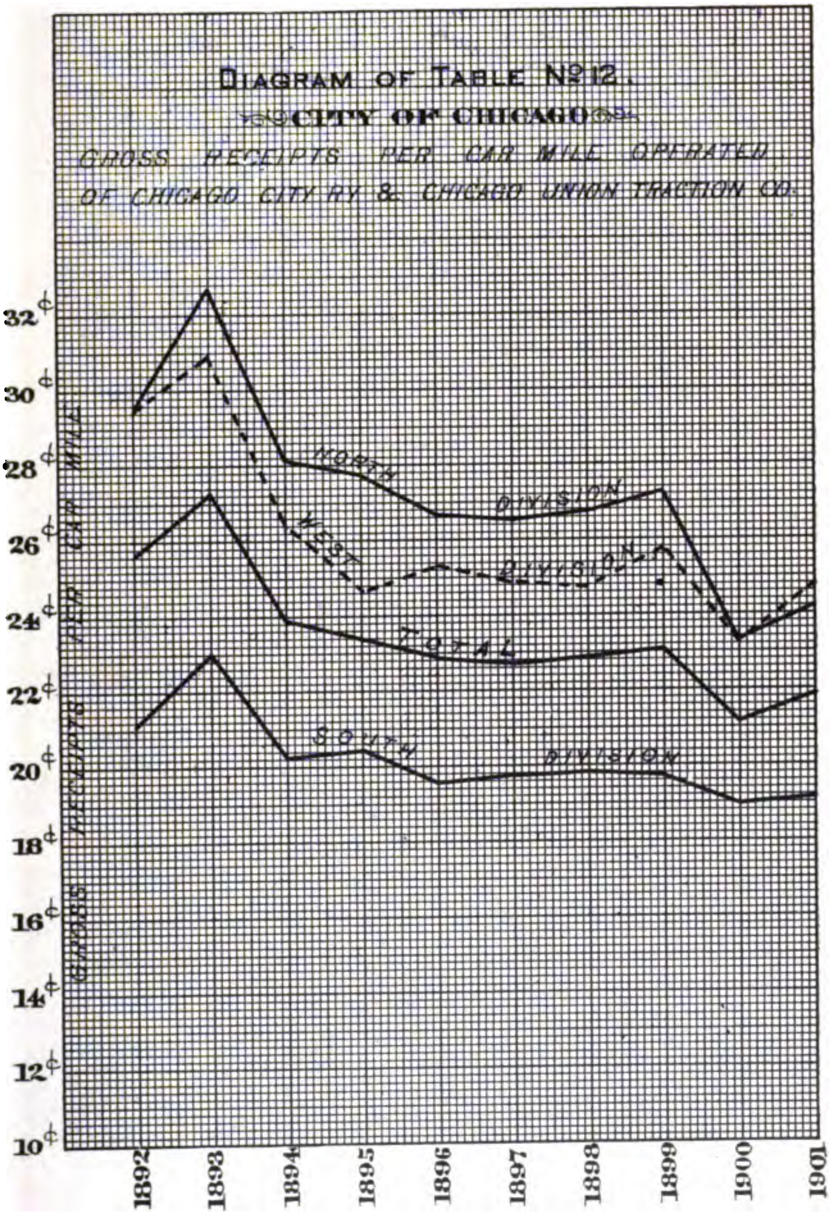
DIAGRAM OF TABLE No 12.
CITY OF CHICAGO
GROSS RECEIPTS PER CAR MILE OPERATED
OF CHICAGO CITY RY & CHICAGO UNION TRACTION CO.
NORTH DIVISION
WEST DIVISION
TOTAL
SOUTH DIVISION
GROSS RECEIPTS PER CAR MILE
32¢
30¢
28¢
26¢
24¢
22¢
20¢
18¢
16¢
14¢
12¢
10¢
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901

FIGURE 11.

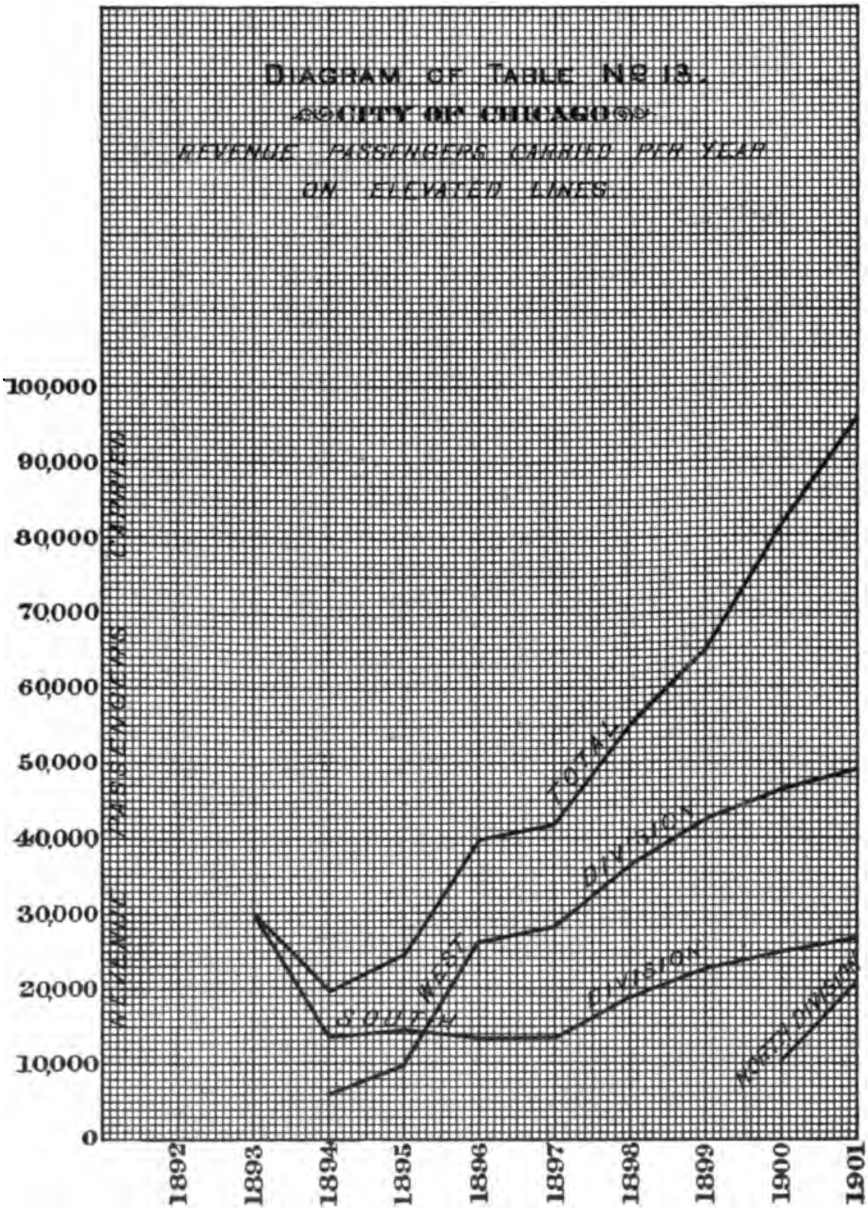
DIAGRAM OF TABLE No 13.
CITY OF CHICAGO
REVENUE PASSENGERS CARRIED PER YEAR
ON ELEVATED LINES.
REVENUE PASSENGERS CARRIED
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901
TOTAL
WEST DIVISION
SOUTH DIVISION
NORTH DIVISION

FIGURE 12.

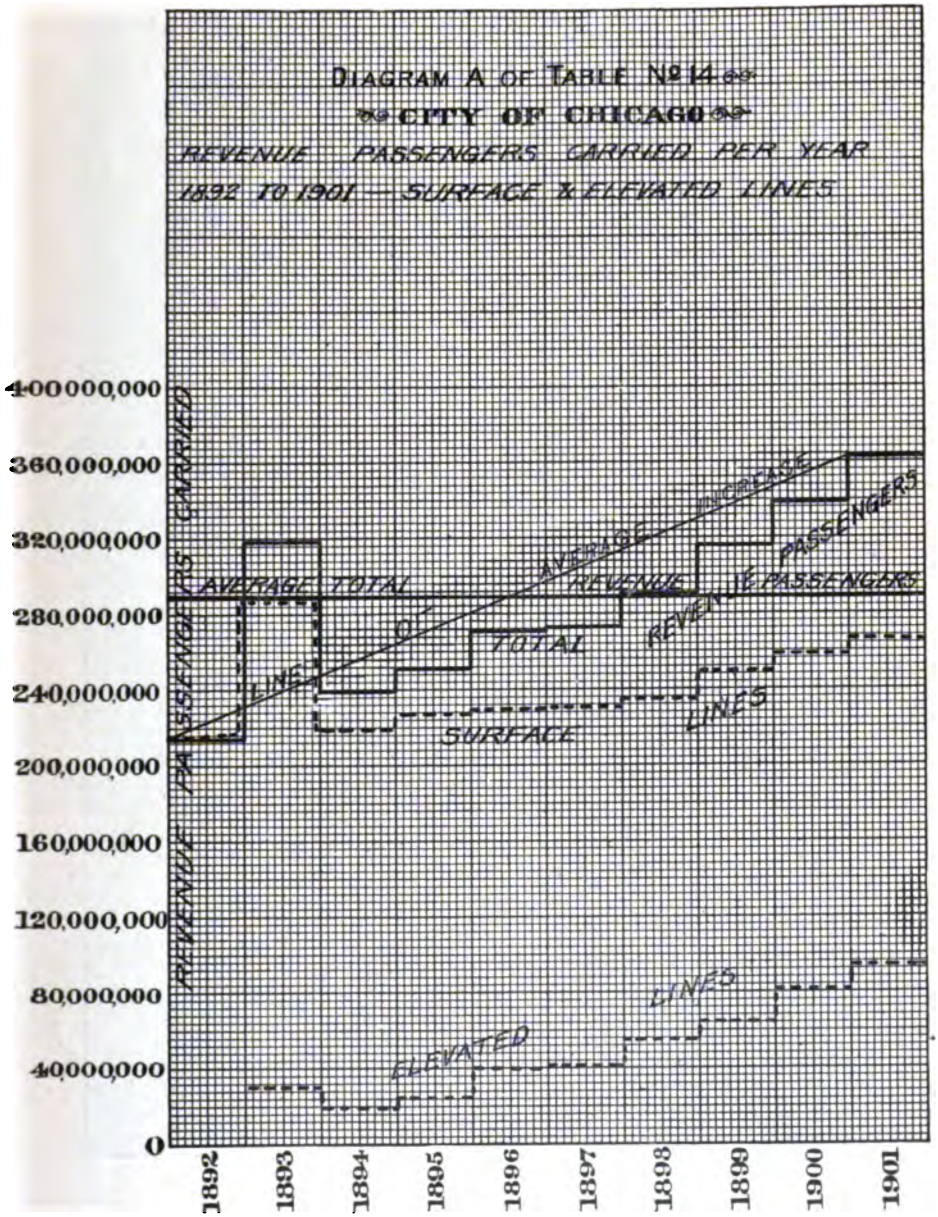
DIAGRAM A OF TABLE Nº 14
CITY OF CHICAGO
REVENUE PASSENGERS CARRIED PER YEAR
1892 TO 1901 — SURFACE & ELEVATED LINES
REVENUE PASSENGERS CARRIED
400,000,000
360,000,000
320,000,000
280,000,000
240,000,000
200,000,000
160,000,000
120,000,000
80,000,000
40,000,000
0
AVERAGE TOTAL REVENUE PASSENGERS
LINE OF AVERAGE INCREASE
TOTAL REVENUE PASSENGERS
SURFACE LINES
ELEVATED LINES
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901

FIGURE 13.

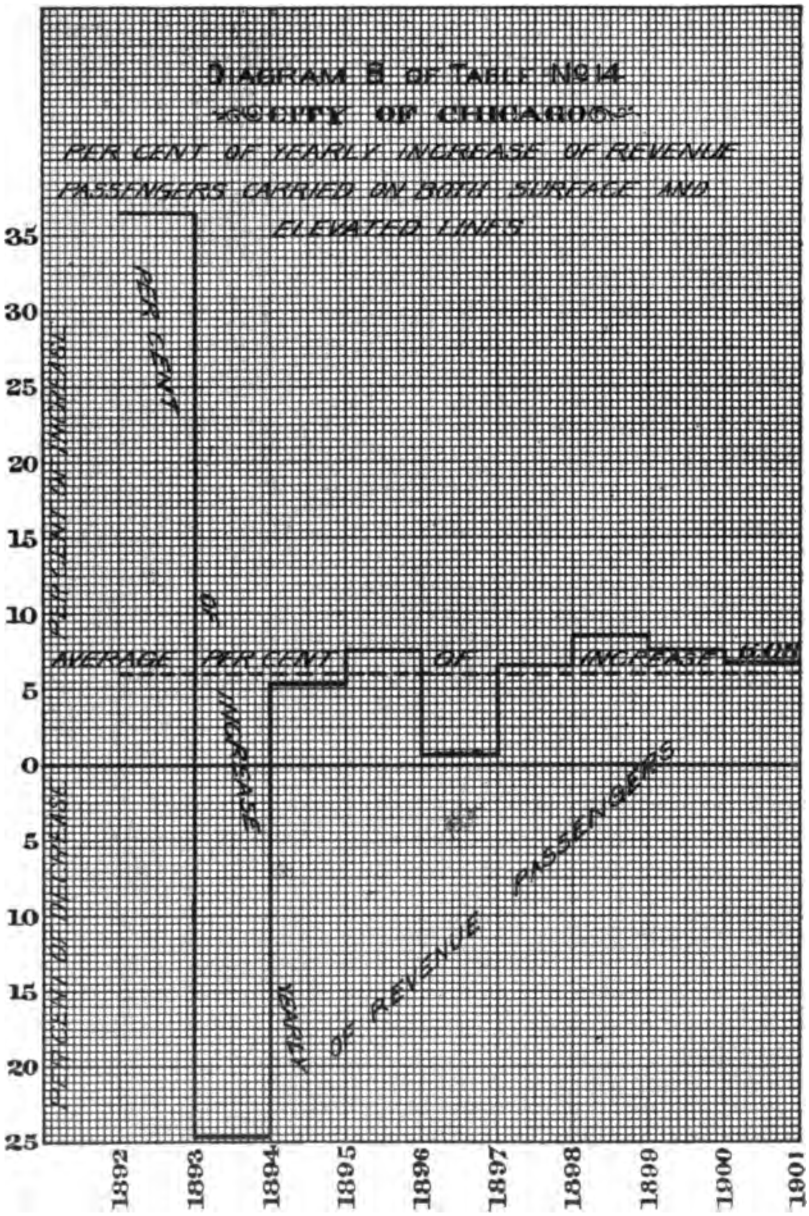
DIAGRAM B OF TABLE Nº 14
CITY OF CHICAGO
PER CENT OF YEARLY INCREASE OF REVENUE PASSENGERS CARRIED ON BOTH SURFACE AND ELEVATED LINES
PER CENT OF YEARLY INCREASE OF REVENUE PASSENGERS
AVERAGE PER CENT OF INCREASE
PER CENT OF INCREASE
PER CENT OF DECREASE
35
30
25
20
15
10
5
0
5
10
15
20
25
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901

FIGURE 14.

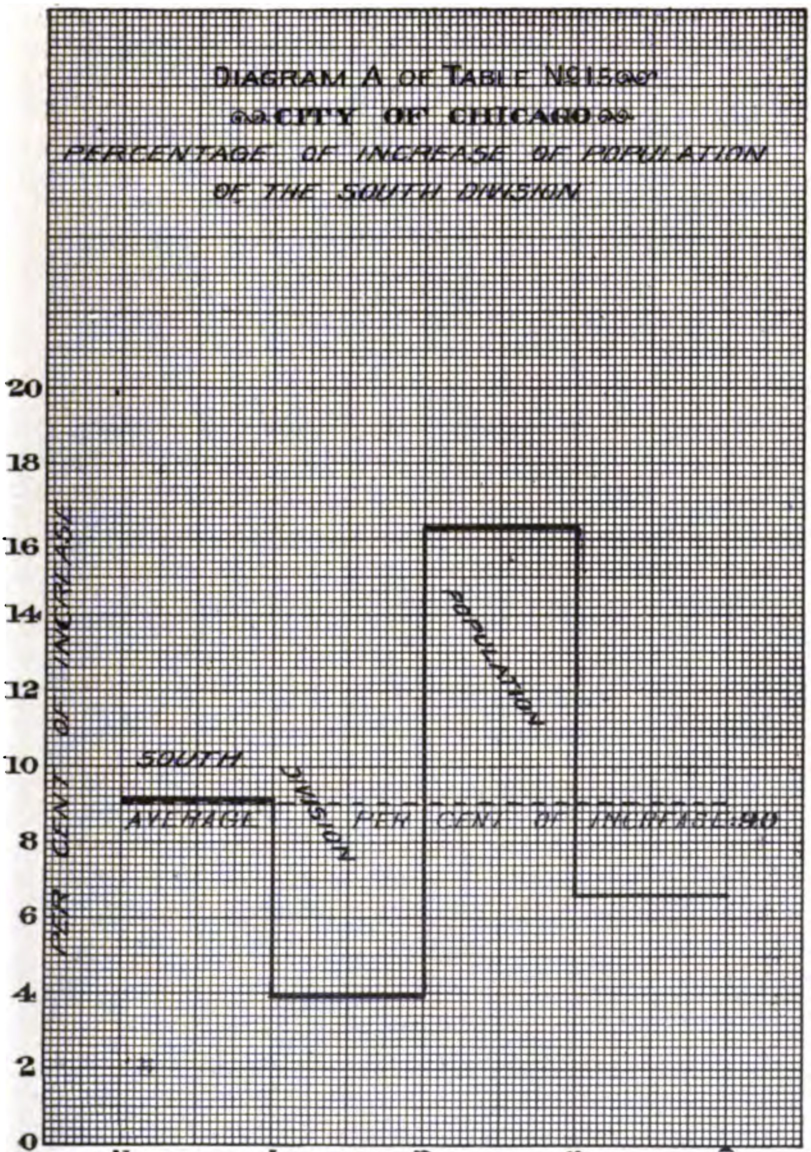
DIAGRAM A OF TABLE No 15
CITY OF CHICAGO
PERCENTAGE OF INCREASE OF POPULATION OF THE SOUTH DIVISION
PER CENT OF INCREASE
SOUTH DIVISION POPULATION
AVERAGE PER CENT OF INCREASE: 9.0
20
18
16
14
12
10
8
6
4
2
0
1892
1894
1896
1898
1900

FIGURE 15.

cent over what the gross receipts were for the year 1892, or an average of 6.18 per cent per annum, not compounded, or 5 per cent per annum compounded. The Surface lines carried during 1901 73.62 per cent of the total passengers carried, and the Elevated lines 26.38 per cent. As the Elevated lines have about settled down to their normal business, they should only be credited with a share of the increase in the future equal to the proportion of their business to the total business. On this basis, and assuming that the increase in the future will be at the same rate as that in the past, the Surface lines should be credited with 4.55 per cent of the increase and the Elevated with 1.63 per cent respectively, if figured not compounded, or 3.68 per cent and 1.32 per cent, respectively, if figured compounded.

TABLE NO. 13.

Revenue Passengers Carried Per Year 1892 to 1901—Elevated Lines.

Year.	So. Div.	No. Div.	W. Div.	Total.
1892	In Construction		In Construction	
1893	30,055,560		"	30,055,560
1894	13,587,855	In Construction	6,000,000	19,587,855
1895	14,217,845	"	9,936,450	24,154,295
1896	13,405,355	"	26,363,907	39,769,262
1897	13,331,625	"	28,236,528	41,568,153
1898	18,898,605	"	36,306,408	55,205,013
1899	22,628,175	"	42,166,559	64,794,734
1900	24,990,820	10,185,141	46,109,290	81,285,251
1901	26,320,150	20,327,005	48,960,994	95,608,149

TABLE NO. 14.

Revenue Passengers Carried Per Year 1892 to 1901 and Per Cent of Increase. Surface and Elevated.

Year.	Surface Lines.	Elevated Lines.	Total.	Per Cent of Increase.
1892	232,956,792	In construction.	232,956,792	
1893	287,961,404	30,055,560	318,016,964	36.50
1894	219,653,752	19,587,855	239,241,607	D 24.77
1895	227,794,532	24,154,295	251,948,827	5.31
1896	230,835,437	39,769,262	270,604,699	7.40
1897	230,570,189	41,568,153	272,138,342	.57
1898	235,014,689	55,205,013	290,219,702	6.64
1899	250,534,496	64,794,734	315,329,230	8.65
1900	258,129,064	81,285,251	339,414,315	7.63
1901	266,835,734	95,608,149	362,443,883	6.78

D, Decrease.

Table 15—shown graphically in Figures 15, 16, 17 and 18—gives the percentage of increase in population and passengers

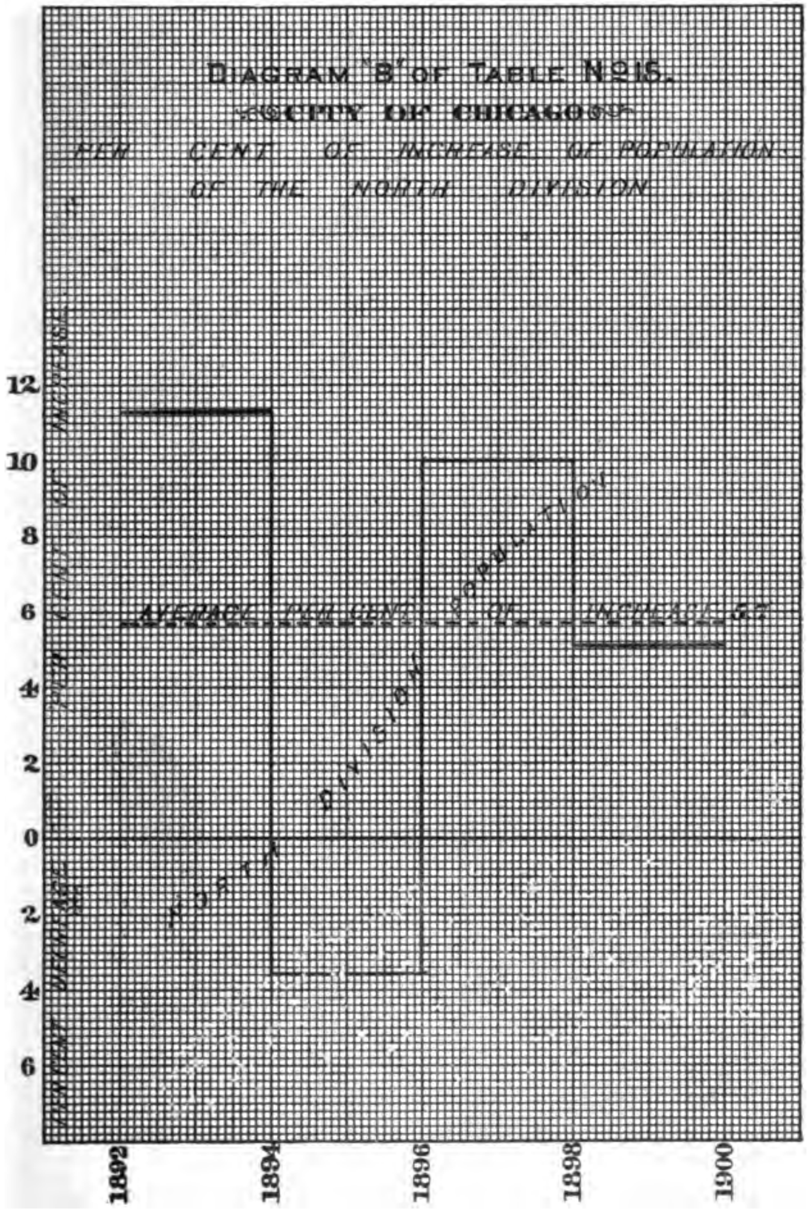
DIAGRAM "B" OF TABLE No 15.
CITY OF CHICAGO
PER CENT OF INCREASE OF POPULATION OF THE NORTH DIVISION
PER CENT OF INCREASE
PER CENT DECREASE
AVERAGE PER CENT OF INCREASE 5.7
NORTH DIVISION POPULATION
12
10
8
6
4
2
0
2
4
6
1892
1894
1896
1898
1900

FIGURE 16.

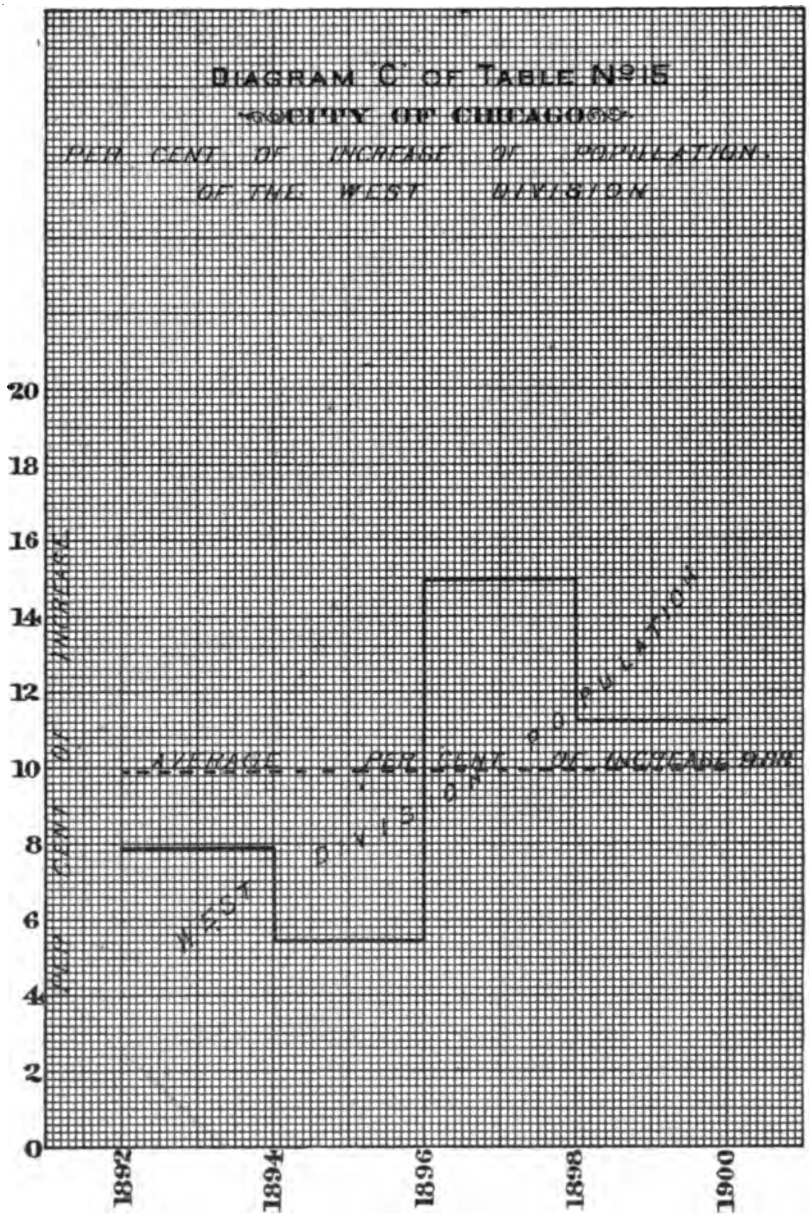
DIAGRAM "C" OF TABLE Nº 15
CITY OF CHICAGO
PER CENT OF INCREASE OF POPULATION,
OF THE WEST DIVISION
PER CENT OF INCREASE
AVERAGE PER CENT OF INCREASE 9.88
WEST DIVISION OF POPULATION
20
18
16
14
12
10
8
6
4
2
0
1892
1894
1896
1898
1900

FIGURE 17.

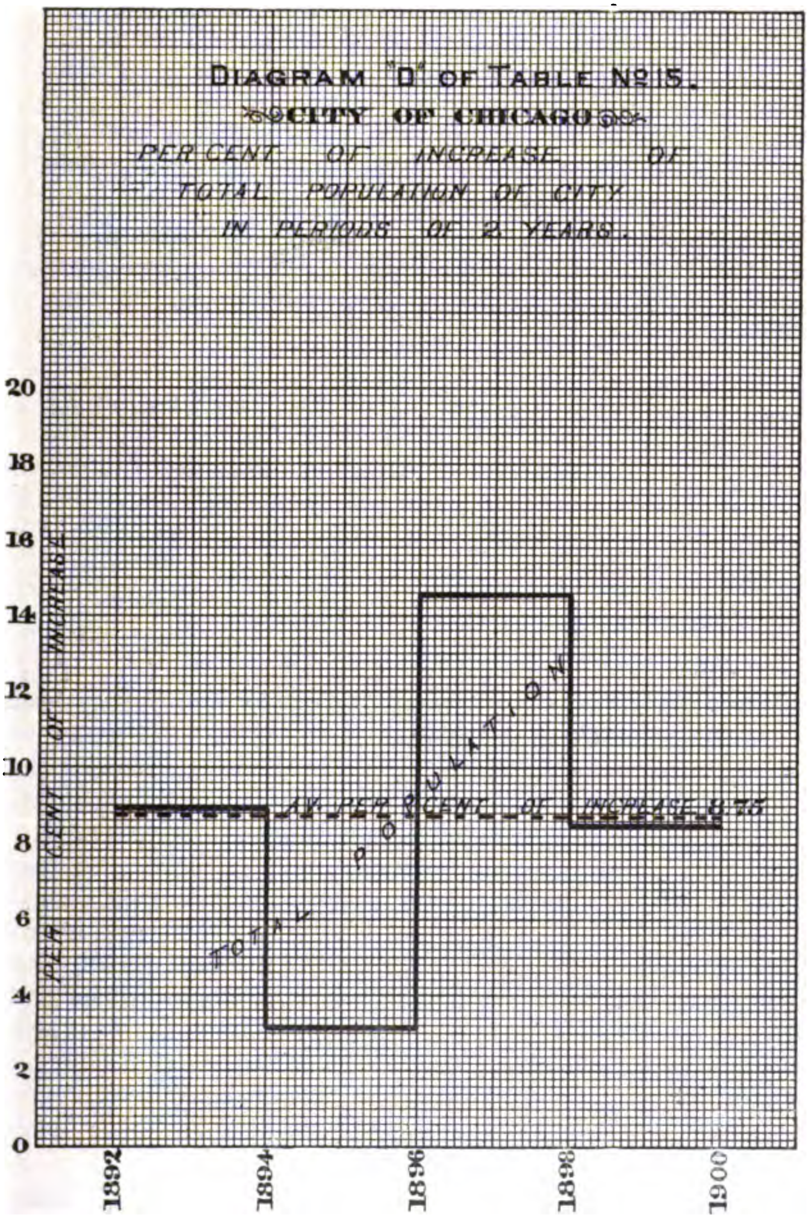
DIAGRAM "D" OF TABLE No. 15.
CITY OF CHICAGO
PER CENT OF INCREASE OF
TOTAL POPULATION OF CITY
IN PERIODS OF 2 YEARS.
PER CENT OF INCREASE
TOTAL POPULATION
AV. PER CENT. OF INCREASE 8.75
20
18
16
14
12
10
8
6
4
2
0
1892
1894
1896
1898
1900

FIGURE 18.

carried on Surface and Elevated lines combined from 1892 to 1900, by Divisions, in two-year periods. It will be noticed that between 1892 and 1894 the population increased nearly 9 per cent, while the passengers carried increased less than 3 per cent. Between 1894 and 1896 the increase in population was a little more than 3 per cent, while the increase in riding was over 13 per cent. Between 1896 and 1898, covering the period of labor troubles, the population increased about 14½ per cent and the riding only 7¼ per cent. Between 1898 and 1900 the population increased 8½ per cent and the passengers carried nearly 17 per cent. These figures would tend to demonstrate that prosperous and depressed times affect the transportation business more than increase in population does.

TABLE NO. 15.

Percentage of Increase in Population and Passengers Carried on Surface and Elevated Lines Combined, from 1892 to 1900, in Periods of Two Years.

	From 1892 to 1894		From 1894 to 1896		From 1896 to 1898		From 1898 to 1900	
	Popl.	Psgrs.	Popl.	Psgrs.	Popl.	Psgrs.	Popl.	Psgrs.
South Division ……	9.16	11.77	3.96	10.43	16.27	5.75	6.63	18.23
North Division ……	11.33	D 1.68	D 3.60	14.03	10.00	3.36	5.05	15.80
West Division …….	7.91	D 3.42	5.43	15.50	14.98	10.87	11.21	16.27
Total ………………	8.93	2.68	3.12	13.11	14.54	7.25	8.45	16.95

D, Decrease.

Since 1892 all of the Elevated Railroads commenced operation; the Illinois Central Railroad installed its efficient express train service; other steam railroads have increased their accommodations; the Chicago Consolidated Traction Company has built its Fulton Street and Elston Avenue lines through the Union Traction Company's territory, and is operating under lease over some of the Union Traction Company's trackage. All of these conditions have been met and lived down, and over 10 per cent increase in traffic recorded up to the close of 1900 by the Surface lines as a whole, as has been shown, chiefly in the South Division. During this same period all horse lines were converted to electric lines with the attendant loss in earnings during construction.

DEDUCTIONS.

The deductions to be drawn from this information are:

First—That the normal increase in population up to and including 1892 was at the rate of about 11.2 per cent per annum compounded, and that since and up to 1901 the increase has dropped to less than 5 per cent per annum, although the figures for 1901 and estimated figures for 1902, bring the average for this last year up to 7.7 per cent.

Second—That the Elevated competition, labor disturbances and depressions in the industrial world at the several periods during the past ten years, and the earnings of the mileage built by the Chicago Consolidated Traction Company, have practically offset any benefits which might have accrued to the surface lines of the Union Traction Company in the North and West Divisions from increase in population,—its gross receipts during the past year being approximately equal to what they were in 1892.

Third—That the Chicago City Railway Company in the South Division has met all competition and depression and shows an increase of passengers carried during the year of 1901 of thirty million passengers over the number carried during the year of 1892, or about 34 per cent increase in nine years.

Fourth—That in a city the size of Chicago the increase in population per year, as recorded since 1892 does not seem to have as much influence in increasing earnings of the transportation business as do depressed times in decreasing them, or prosperous times in augmenting them.

COMPARISON OF THE GROWTH OF CHICAGO WITH THE GROWTH OF OTHER CITIES, AND A DISCUSSION OF THE PROBABLE FUTURE GROWTH OF CHICAGO AND PROBABLE FUTURE GROSS EARNINGS OF THE SURFACE AND ELEVATED RAILWAYS.

In order to arrive at a basis to estimate the future growth of Chicago and from this the probable future gross receipts of a complete street railway system for the city, thereby attempting to comply with the condition of my commission "To make estimate of net earnings to be derived from the operation of a new system based on present business, with estimate of probable increase in business in periods of five years formulated from past performances, from which rates of compensation or adjustment of rates or fares can be computed," I have plotted various curves showing the growth of several of the leading cities of the world.

I have omitted from this text all technical terms, mathematical formulae, symbols and calculations upon which my conclusions are based, and have used graphical methods, for by so doing I believe I can best impart, to the greatest number, a clear idea of the variable elements that must be considered in an analysis of this subject.

Separate curves, Figures 19 to 27 inclusive, were plotted for each of these cities showing their population at different years in five-year periods, as given by the official census reports. The points on the diagrams corresponding to population at different periods of time were connected by dotted or broken lines, which show the rate of increase between these periods. The curve representing the average growth of each city was then computed from these broken curves and plotted as shown in full lines. The average rate of increase which this full line curve represents for each city is given on each curve sheet.

By an examination of these curves it will be found that Chicago has increased in population at a much more rapid rate than any other city, and while it may continue to so increase for some years to come it cannot be hoped that it will perpetually maintain its present rate of increase. For this reason, if for no other, it would be unsafe to assume that the earnings of the street railways of Chicago would increase at the same rate that they have increased during the past ten years.

Fig. 19 shows the increase in population of the City of London from 1800 to 1860 to be at an average rate of 1.8 per cent per annum.

Fig. 20 shows the increase for the City of London from 1861 to 1901 to be at the average rate of 1.22 per cent per annum, while Fig. 21 shows the City of Greater London to have increased from 1891 to 1901 at the average rate of 1.55 per cent per annum.

Fig. 22 gives the growth of the City of Paris for 100 years, from 1800 to 1900, and shows the average rate of increase to be 1.675 per cent per annum.

Fig. 23 shows the growth of the City of Berlin from 1861 to 1901. This city more nearly approaches Chicago in its general character than any other European city, and shows an average annual increase in population of 3.225 per cent, which, as would be expected, is the highest average rate of any European city.

Fig. 24 shows the City of Philadelphia between 1800 and 1900, or a period of 100 years, to have increased at the average rate of 3.5 per cent per annum.

Fig. 25 gives the increase in population of the City of New York from 1800 to 1890, and shows the average rate of increase to be 3.6 per cent per annum.

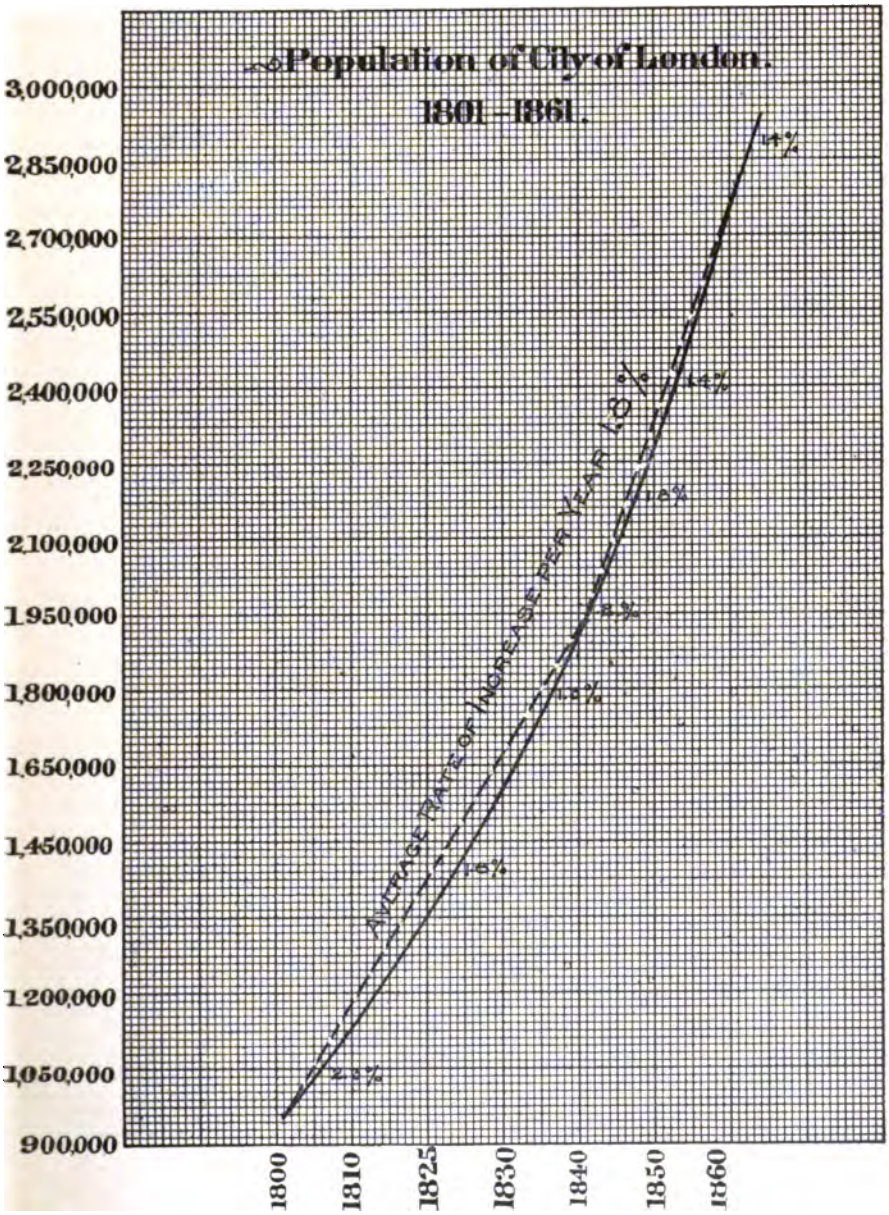
Population of City of London.
1801-1861.
3,000,000
2,850,000
2,700,000
2,550,000
2,400,000
2,250,000
2,100,000
1,950,000
1,800,000
1,650,000
1,450,000
1,350,000
1,200,000
1,050,000
900,000
1800
1810
1825
1830
1840
1850
1860
AVERAGE RATE OF INCREASE PER YEAR 1.8%
1.4%
1.4%
1.8%
.8%
1.3%
1.6%
2.3%

FIGURE 19.

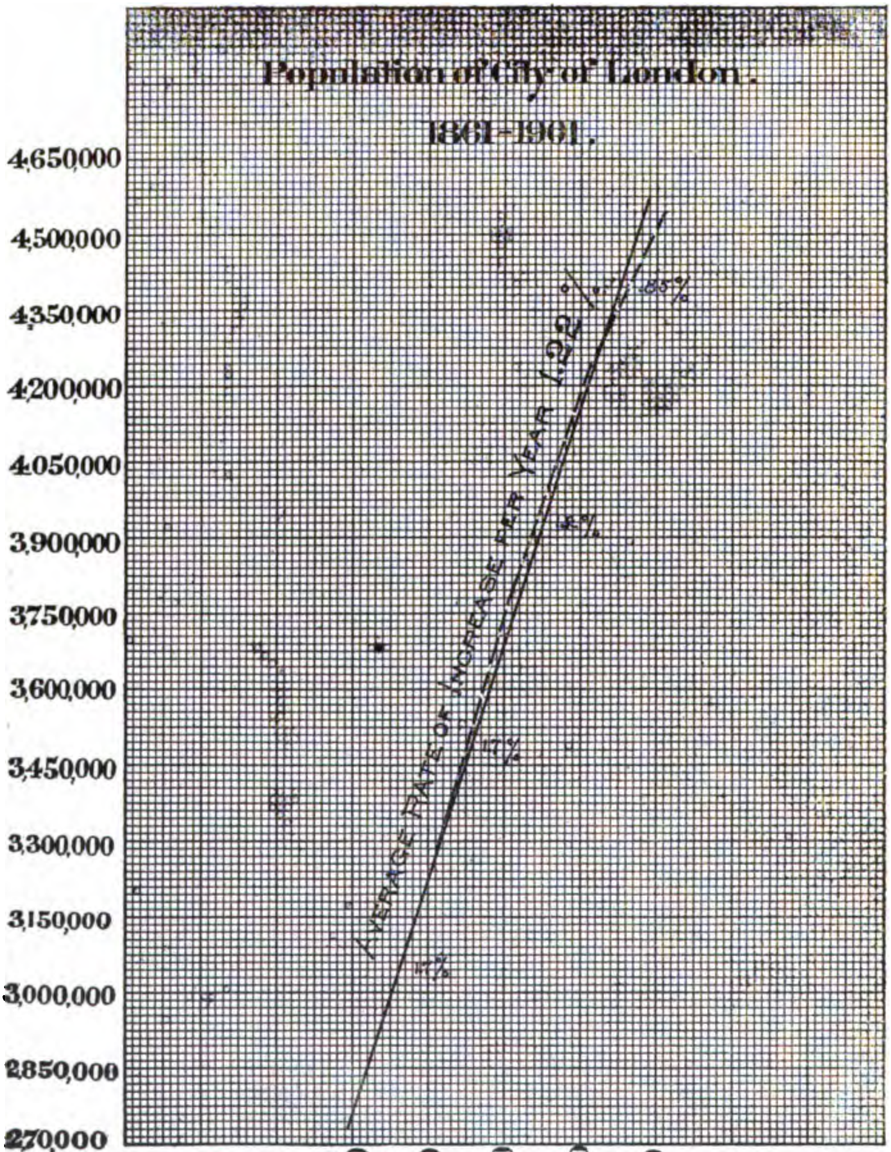
Population of City of London.
1861-1901.
4,650,000
4,500,000
4,350,000
4,200,000
4,050,000
3,900,000
3,750,000
3,600,000
3,450,000
3,300,000
3,150,000
3,000,000
2,850,000
270,000
1860
1870
1880
1890
1900
AVERAGE RATE OF INCREASE PER YEAR 1.22%
.85%
1.7%
1.7%

FIGURE 20.

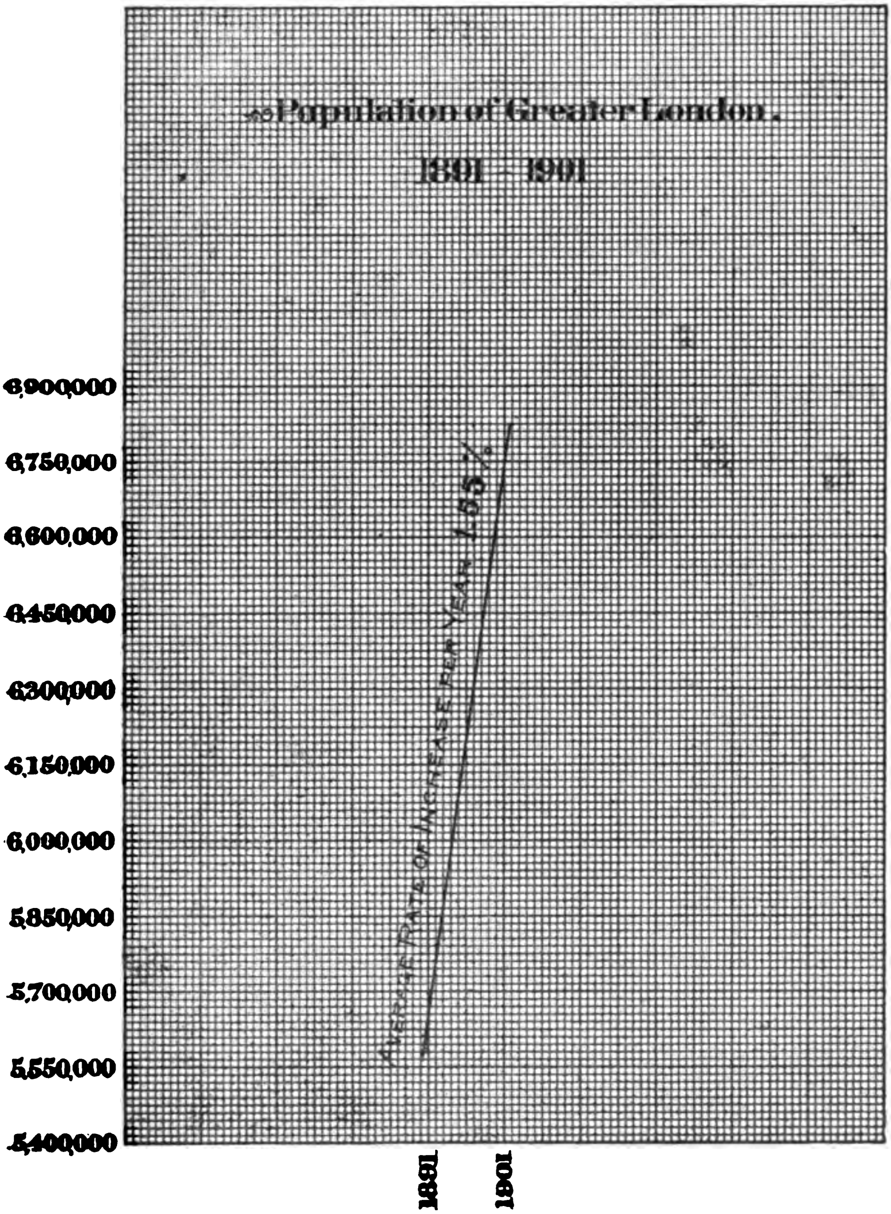
Population of Greater London.
1891 - 1901
6,900,000
6,750,000
6,600,000
6,450,000
6,300,000
6,150,000
6,000,000
5,850,000
5,700,000
5,550,000
5,400,000
Average Rate of Increase per Year 1.55%
1891
1901

FIGURE 21.

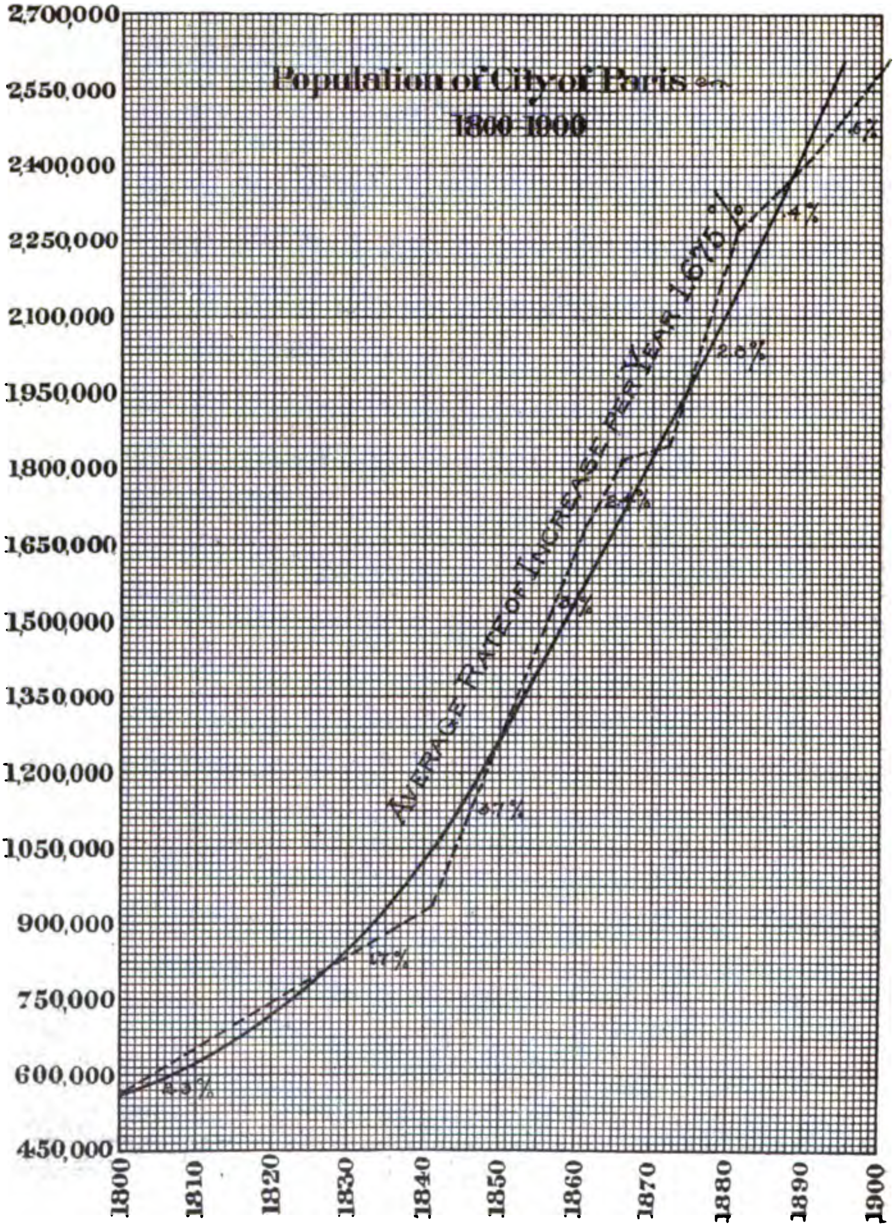
Population of City of Paris
1800-1900
Average Rate of Increase per Year 1.675%
2.8%
.4%
2,700,000
2,550,000
2,400,000
2,250,000
2,100,000
1,950,000
1,800,000
1,650,000
1,500,000
1,350,000
1,200,000
1,050,000
900,000
750,000
600,000
450,000
1800
1810
1820
1830
1840
1850
1860
1870
1880
1890
1900

FIGURE 22.

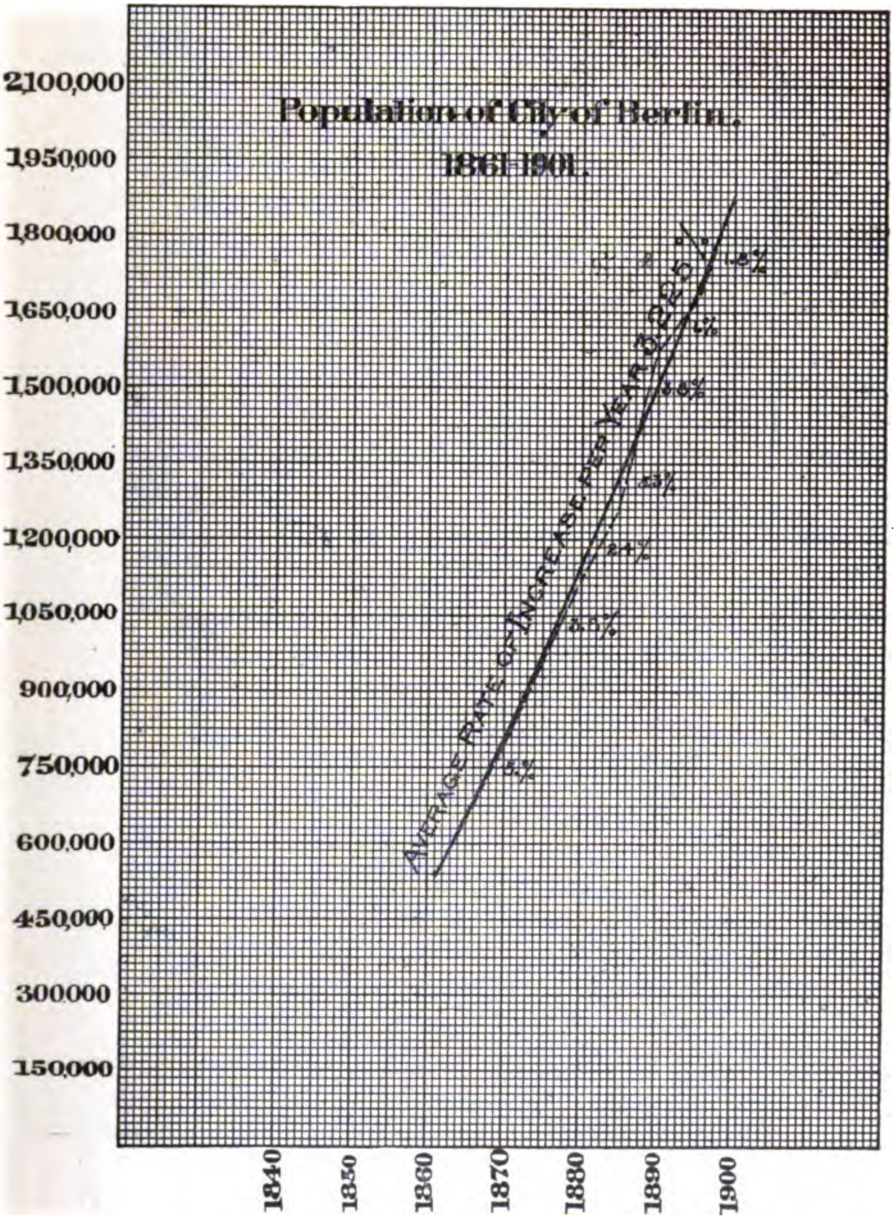
Population of City of Berlin.
1861-1901.
AVERAGE RATE OF INCREASE PER YEAR 3.225
5%
3.5%
2.4%
3%
1.8%
1%
.8%
2100,000
1950,000
1800,000
1650,000
1500,000
1350,000
1200,000
1050,000
900,000
750,000
600,000
450,000
300000
150000
1840
1850
1860
1870
1880
1890
1900

FIGURE 23.

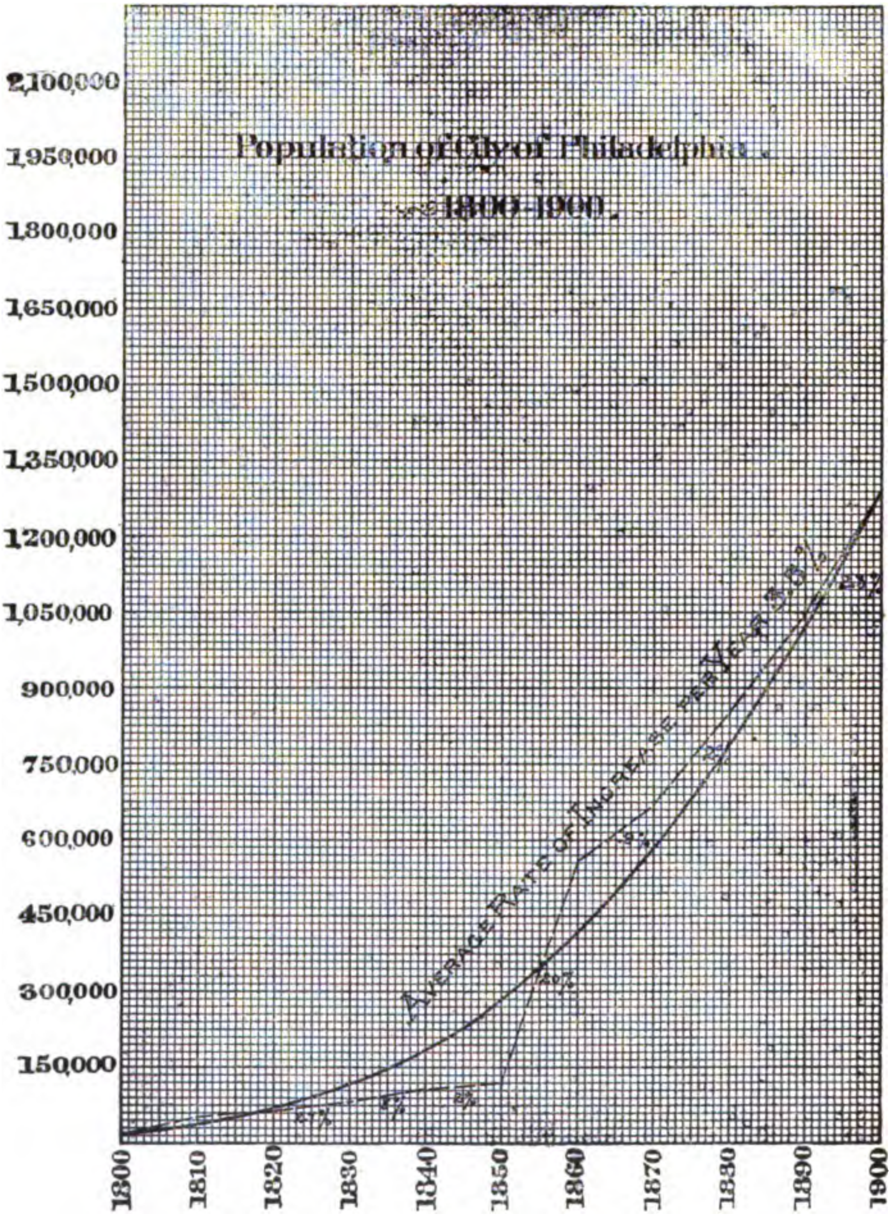
Population of City of Philadelphia.
1800-1900.
2,100,000
1,950,000
1,800,000
1,650,000
1,500,000
1,350,000
1,200,000
1,050,000
900,000
750,000
600,000
450,000
300,000
150,000
Average Rate of Increase per Year 3.5%
1800
1810
1820
1830
1840
1850
1860
1870
1880
1890
1900

FIGURE 24.

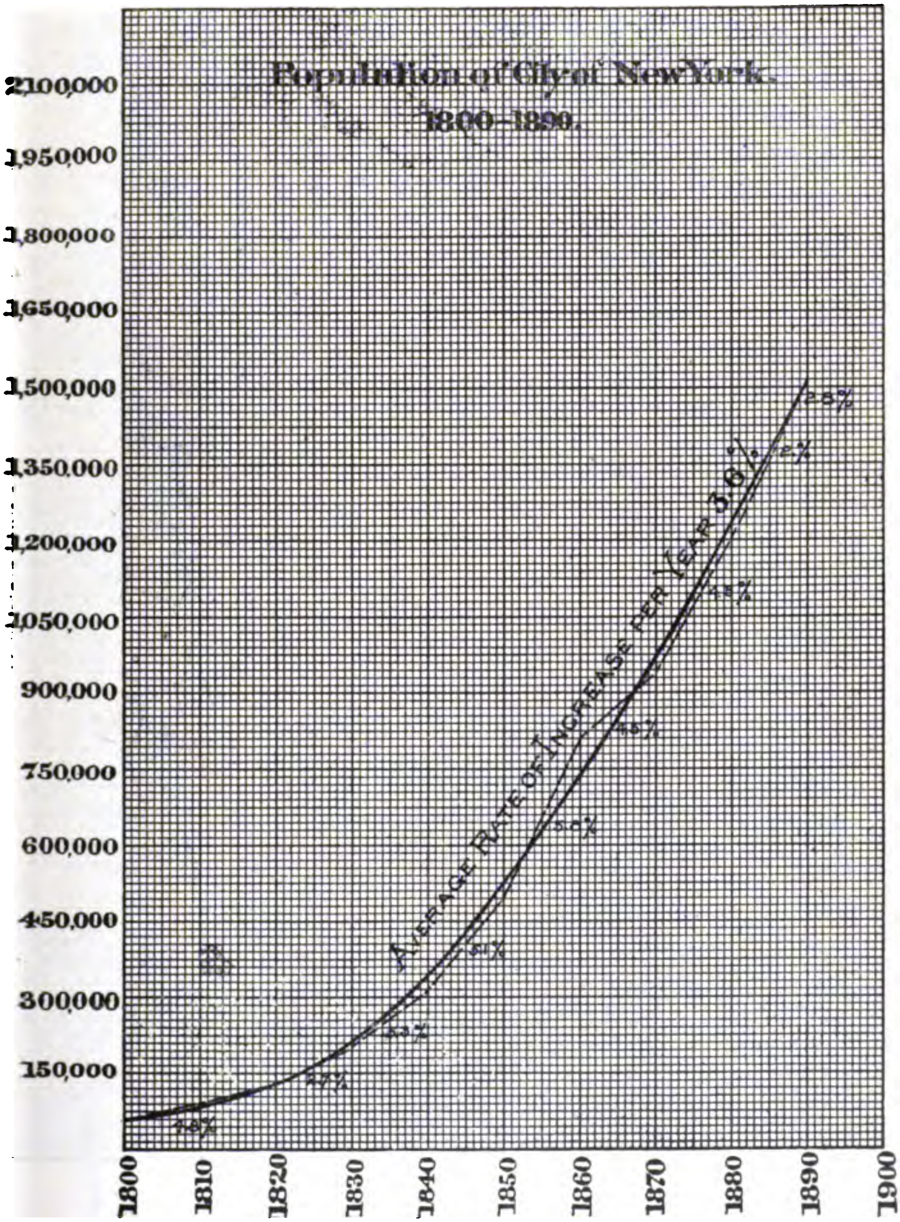
Population of City of New York.
1800-1890.
2,100,000
1,950,000
1,800,000
1,650,000
1,500,000
1,350,000
1,200,000
1,050,000
900,000
750,000
600,000
450,000
300,000
150,000
1800
1810
1820
1830
1840
1850
1860
1870
1880
1890
1900
Average Rate of Increase per Year 3.6%
2.5%
2%

FIGURE 25.

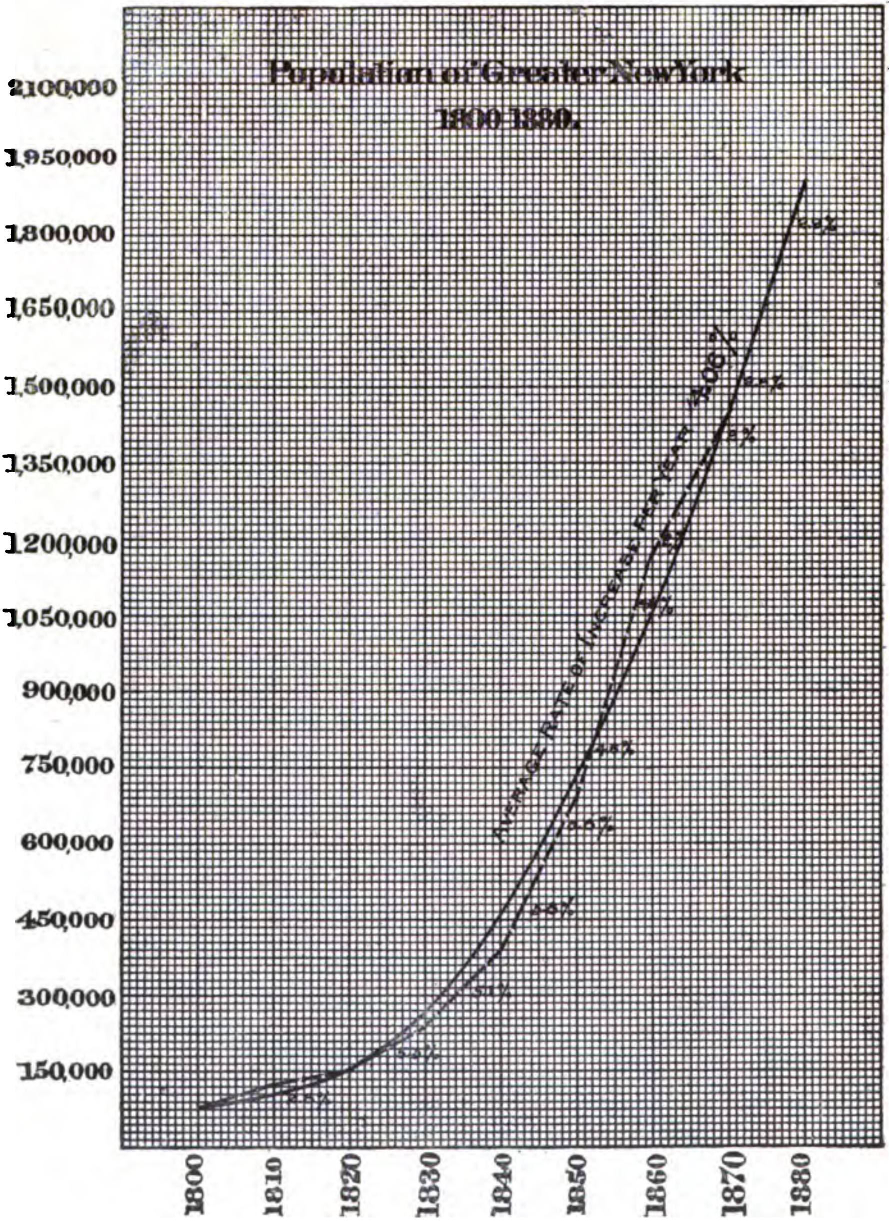
Population of Greater New York
1800 1880.
2,100,000
1,950,000
1,800,000
1,650,000
1,500,000
1,350,000
1,200,000
1,050,000
900,000
750,000
600,000
450,000
300,000
150,000
1800
1810
1820
1830
1840
1850
1860
1870
1880
AVERAGE RATE OF INCREASE PER YEAR 4.06%

FIGURE 26.

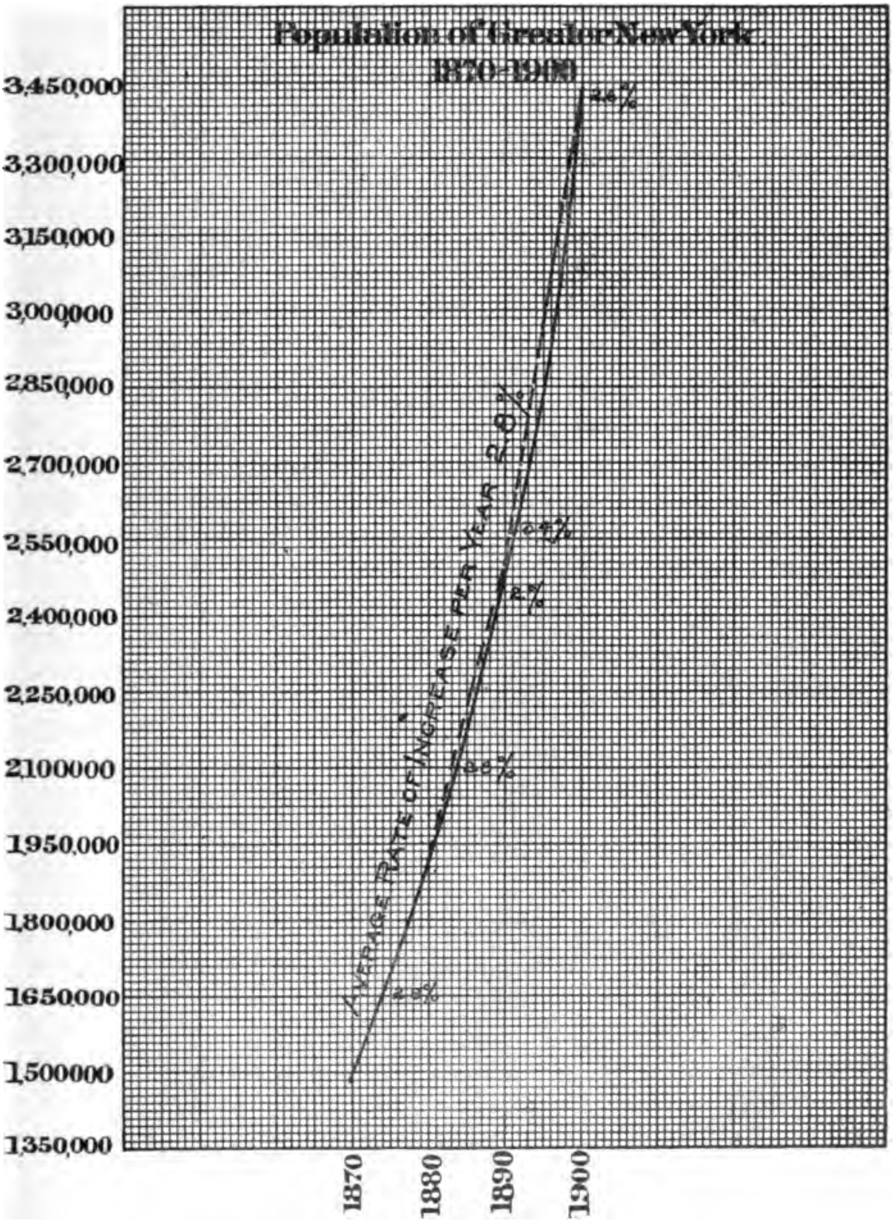
Population of Greater New York.
1870-1900
3,450,000
3,300,000
3,150,000
3,000,000
2,850,000
2,700,000
2,550,000
2,400,000
2,250,000
2,100,000
1,950,000
1,800,000
1,650,000
1,500,000
1,350,000
AVERAGE RATE OF INCREASE PER YEAR 2.8%
2%
1870
1880
1890
1900

FIGURE 27.

Fig. 26 shows the growth of the territory which now constitutes Greater New York, and shows the increase for this territory, between the years of 1800 and 1880, to be at the average rate of 4.06 per cent per annum.

Fig. 27 shows the rate of increase of the same territory between 1870 and 1900 to be at the average rate of 2.8 per cent per annum. The average rate of increase for this territory from 1800 to 1900, or a period of 100 years, is 3.9 per cent, but is not graphically shown by a continuous curve, for by combining Figures 26 and 27 the complete curve can be obtained.

On Plate 12 is plotted a curve for each of the above cities. The horizontal distances represent population, each space representing 50,000 persons.

The vertical distances represent percentage of increase from one year to another.

Each curve then represents the yearly rate of increase of population for one of the above cities during a given period of time, the full line curve being the true curve made up by averaging the broken line curve which represents actual fixed data obtained from census reports.

By averaging all the true curves on Plate 12 an ideal curve, A, is obtained, shown on Plate 13, which represents the average rate of yearly increase of population for all the cities considered, for different periods of time measured in terms of population.

This curve shows that the average rate of increase for all the above cities is a gradually decreasing one.

Curve B, representing this average *yearly rate* of *decrease* of the *average rate* of *increase* in population is plotted on the same plate, and is derived as before from the broken line curves, a, b, on the same plate, which represent the summation of all the averages obtained from Plate 12.

Coming now to Chicago, and referring back to Fig. 1, Page 56, we find Chicago to have increased between the years 1837 and 1902 at an average rate of 8.6 per cent per annum, and from 1892 to the present time it has increased at the rate of 4.9 per cent per annum, and during the year of 1902 at the rate of 7.7 per cent.

The population of Chicago for 1902 is estimated to be about 2,000,000.

The curve of population increase on Plate 13 shows that at 2,000,000 population the average rate of increase per year for the cities considered is 3 per cent.

Plate 14 shows curves C to L inclusive, which represent the increase in population of the City of Chicago for a period of fifty-two years from 1900 under different assumed rates of increase.

The figures on the right of the plate corresponding to vertical divisions represent population, while the figures on the left of the plate corresponding to the same vertical divisions represent gross earnings in dollars per annum. Assuming that the gross earnings per capita in the future will remain at $10, as in 1900, any curve will show the population by reading the figures on the right of the diagram, and gross earnings in dollars per annum by reading the figures to the left of the diagram.

On this plate curves C, D, E and F, representing 5, 6, 7 and 8 per cent annual increase, respectively, are plotted, compounded, from 1900, i. e., the population for any year is obtained by increasing that of the preceding year by 5, 6, 7 or 8 per cent, as the case may be. The 5 per cent curve, C, shows that at this rate the population of Chicago in 1952 would be approximately 18,500,000. However, the average rate of increase for Chicago for 1902, as shown on Plate 12, was actually 7.7 per cent, or on the ideal curve, 7 per cent.

Starting at 1902 with 7 per cent and applying "the law of *yearly decrease on* the *rate* of *increase*" a curve was plotted on Plate 14, which shows that according to this law the population of Chicago in 1952 would be about 13,250,000.

At 8 per cent yearly increase (compounded) from 1900, as shown by curve F on the same plate, the population of Chicago in 1936, or in 35 years from the present time, would be approximately 26,500,000, thus showing how incorrect it is to assume that the future increase in population could be based upon the past average rate of increase of 8.6 per cent compounded, as shown on Fig. 1, Page 56, or at the present rate of 7.7 per cent compounded, or at any other compounded rate based upon present conditions, except for short periods of time.

The 5, 6, 7 and 8 per cent compounded curves, C, D, E & F, cross the 7 per cent curve, I, of the "law of decreasing rate of increase" at the years 1940, 1928, 1918 and 1913 respectively, and beyond these points rise more and more rapidly, while curve I, according to "the law of decreasing rate of annual increase," becomes more nearly flat, which shows a more regular and more nearly constant increase in population per year in actual numbers, and corresponds to the average growth in the past.

If, then, the national and local conditions governing the growth of Chicago were to average in the future exactly as in the past, it is fair to suppose that the law would hold and that the population in 1952 would be 13,250,000.

Now plotting the probable future growth of Chicago on Plate 14 according to "the law of decreasing rate of annual increase," as shown on Plate 13, but taking 3 per cent as a basis upon which to apply the law instead of 7 per cent, as before, we have a curve G conforming to the average growth of the European cities hereinbefore considered.

This curve shows that the population of Chicago in 1952 would be 5,250,000.

These two curves, I and G, Plate 14, of population increase, as determined according to the law, but taking the two extremes for bases, represent the limits between which the growth in population of Chicago should vary.

The probable average growth of any city cannot be determined with any degree of safety except within reasonable limits. This is well illustrated in the case of Philadelphia, Plate 12, for prior to 1861 any law applied to its growth at that time would have shown a rapid increase in population in the future, whereas the rate of increase dropped in five years from 33 per cent per annum to 9.7 per cent, and in another five years to 2.9 per cent. The law then cannot safely be used except as a graphical representation of what the increase in population should be in the future between certain limits.

In order to approximate the gross receipts for the future of all the surface and elevated lines of Chicago the receipts per capita of 74 cities of the United States of different populations, including St. Paul, Minneapolis, Boston. Chicago, Philadelphia and New York, have been compared.

A curve was plotted, as shown in Figure 28, page 97, on which the horizontal divisions represent population, each of the larger spaces representing 1,000,000 inhabitants. The figures on the left corresponding to the vertical spaces represent gross receipts in dollars per year per capita based on the present 5-cent fare and those on the right represent rides per capita per year. According to this curve then, for a city of 750,000 inhabitants the rate of gross receipts for the street railways should be about $8 per capita. For a city of 2,000,000 it should be $10.60 per capita, and for a city of 4,500,000 it should be $13 per capita.

Applying the law of increasing rate of receipts per capita as shown on Fig. 28, to the two curves, I and G, of population increase shown on plate 14, and figured according to "the law of decreasing rate of increase" per annum; one starting on a 7 per cent rate in 1902, and the other on a 3 per cent rate in 1902; we have two curves, J and K, which represent the gross receipts of all the surface and elevated lines of Chicago, corresponding to the two curves, I and G, of population increase, and which show that the total gross receipts for 1952 should be $222,500,000 on the 7 per cent increase basis, and $70,000,000 on the 3 per cent increase basis.

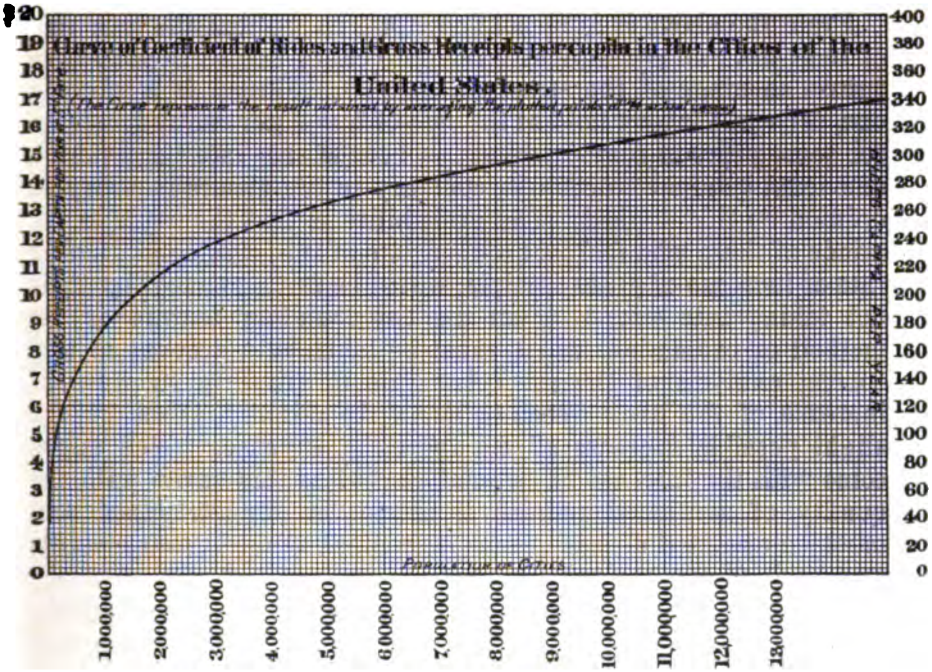

FIGURE 28.

These two curves represent, therefore, the two extremes between which the average gross receipts of all the combined surface and elevated lines of Chicago will vary during the period between 1902 and 1952, and the probability is that an average curve figured according to the law on a 5 per cent base, as shown on curve K on plate 14, will be found to approximate the actual growth of the future, and curve L on the same plate represents the probable gross receipts for this rate of increase for corresponding periods.

On Plate 15 are plotted curves M to S inclusive, showing operating expenses per year corresponding to each of the curves, C to L inclusive, of population increase shown on plate 14, on the assumption that the operating expenses will remain 60 per cent of the gross receipts, based on a 5-cent fare, which, judging from past experience, is a reasonable assumption. Since the degree of modification in the percentage, due to the possible change in economies and population, cannot be definitely determined, this percentage has been retained as constant.

From the above it is reasonably clear to me that the true rate of increase, and consequently the true curve upon which to base future earnings of the street railways in Chicago, is a varying one, for while it may hold at the rate of 5 or 6 per cent per annum for some years to come it cannot be held at this rate perpetually, and must gradually decrease, contrary to the generally accepted opinion on this subject. The probability is that the error in the minds of those who feel that a fixed rate of increase, or increasing rate of increase of gross receipts, would be fair, is caused by their not taking into consideration the compounding feature of the method of calculation which must be taken into account in any correct analysis of the subject. This decrease in the rate of increase of the gross receipts would be slightly offset by the slight possible decrease of the operating expenses which might come with the increase of population, but as this varies with the quality of service demanded it cannot be predetermined and must be assumed at some fixed percentage of the gross receipts as a basis of comparison.

For these reasons I cannot see my way clear to recommend any fixed percentage of increase for any great length of time, but have endeavored to give as complete an analysis of this subject and set forth the information derived from this analysis in as clear and scientific a manner as practicable, hoping thereby to form the basis for intelligent discussion of this subject, and that an equitable adjustment of the matter can be reached, *which adjustment must be based upon the judgment of past and future business and industrial conditions,* rather than upon any scientific law which can safely be deduced from the figures of the past, for, as has been previously pointed out, a financial depression of the country has a greater tendency to decrease the gross receipts of street railways than an increase in population has to raise them.

It is, however, clear to me that if money compensation is to be required by the City for franchise rights the only equitable and just basis of compensation to the City should be based upon *a percentage of the gross receipts, whatever they may be,* of *each* of the companies, *payable annually,* owing to the fact that any general law, even though it might be correct, which was deduced from the past records of the *combined* receipts of the *surface and elevated railways* of the city, could not equitably be applied to any *individual* road for the reason that industrial conditions, due to the loss of population from the territory of one road to another, or to competitive roads entering the territory of any given road, the gross receipts of the road so affected might be greatly decreased, thereby preventing it from paying a fixed amount into the City Treasury, which amount had been previously fixed and based upon a fixed percentage of the past records during prosperous times.

In case the City should see fit to require a fixed amount per annum, this amount being a certain percentage of some future predetermined gross earnings based upon past earnings, it is clear to me that any such arrangement should be only for short intervals of time, and that readjustments should be made between the City and railroads in periods not over five years apart.

OPERATING AND FINANCIAL STATISTICS.

There seems to have been little uniformity in the methods of accounting the cost of operation, during the past years, so no attempt has been made to furnish figures, on cost of operation back of the last fiscal year of each company. In Table 16 is given a statement, in condensed form, of the Chicago City Railway Company of the South Division for one year ending December 31, 1901, and in Table 17, of the Chicago Union Traction Company, covering the South and West Divisions for one year ending June 30, 1902.

Table 18 shows the operations of the two Companies for one year, combined.

From Tables 16 and 17 it will be seen that the Chicago City Railway Company operates its Cable lines for 2 cents a car mile *less* than its Electric service, while it costs the Union Traction Company about 2 cents a car mile *more* than its Electric service. This is due largely to the fact that in the South Division about 45 per cent of the total business is done on the Cable lines, requiring only three power plants. In the North and West Divisions only 34½ per cent of the total business is done on the Cable, requiring eight extensive power plants for the operation of the Cable system. While a change from Cable to Electric power in the South Division would not apparently save money in operation, the increase which could be obtained in speed and the more elastic methods of routing that could be adopted would be of material benefit to the Company as well as the public.

In the North and West Divisions had the Cable lines been Electric during their past fiscal year the Company would have saved over 2 cents a mile on all car mileage operated by Cable, or about $225,000.

TABLE NO. 16.

Statement of Operations—Chicago City Railway Co. Year Ending Dec. 31, 1901.

Items.	Electric.	Cable.	Horse.	Total.
Maintenance of Way and Equipment	$ 278,385.25	$ 262,381.18	$ 945.58	$ 541,712.01
Power Production	$ 199,540.75	$ 150,850.70		$ 350,391.45
Conducting Transportation	$ 1,688,428.40	$ 1,025,081.64	$ 26,541.57	$ 2,740,051.61
Cost of Operating	$ 2,166,354.40	$ 1,438,313.52	$ 27,487.15	$ 3,632,155.07
Receipts from Passengers.	$ 3,647,135.61	$ 2,188.588.15	$ 20,662.85	$ 5,856,386.61
Net Earnings From Operation of Cars	$ 1,480,781.21	$ 750,274.63	*$ 6,824.30	$ 2,224,231.54
Miles Run	16,727,540	13,809,620	106,090	30,643,250
Passengers Carried	73,403,433	44,041,678	418,879	117,863,990
				Average.
Receipts Per Mile	21 8-10c	15 8-10c	19 5-10c	19 1-10c
Operating Cost Per Mile	12 95-100c	10 41-100c	25 90-100c	11 85-100c
Percentage of Operating Expenses to Gross Re-Receipts	59 40-100%	65 72-100%	133%	62 02-100%
Per Cent of Total—				
Miles Run	54 59-100%	45 06-100%	35-100%	100%
Passenger Receipts	62 28-100%	37 37-100%	35-100%	100%

*Loss.

TABLE NO. 17.

Statement of Operations—Chicago Union Traction Co. Year Ending June 30, 1902.

Items.	Electric	Cable.	Total.
Maintenance of Way and Equipment	$ 610,054.57	$ 480,842.03	$ 1,090,896.60
Power Production	$ 322,104.95	$ 239,973.59	$ 562,078.54
Conducting Transportation	$ 1,868,035.14	$ 1,049,709.15	$ 2,917,744.29
Cost of Operating	$ 2,800,194.66	$ 1,770,524.77	$ 4,570,719.43
Receipts From Passengers	$ 4,923,089.41	$ 2,856,971.74 $ 21,004.73*	$ 7,801,075.78
Net Earnings From Operation of Cars.	$ 2,122,894.75	$ 1,107,451.70	$ 3,230,356.35
Miles Run	20,018,334	10,619,779 93,938*	30,732,051
Passengers Carried	98,562,555	57,154,184	156,136,898

*Horse.

TABLE NO. 17.—Continued.

Items.	Electric	Cable.	Average.
		420,159*	
Receipts Per Mile	24 59-100c	26 90-100c 22 36-100c*	25 38-100c
Operating Cost Per Mile	13 98-100c	16 52-100c	14 87-100c
Percentage of Operating Expenses to Per Cent of Total Gross Receipts	56 87-100%	61 52-100%	58 59 100%
Miles Run	65 13-100%	34 55-100% .32-100%*	100%
Passenger Receipts	63 10-100%	36 62-100% 28-100%*	100%

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*Horse.

TABLE NO. 18.

Statement of Operations. One Year—Chicago City Railway Co. and Chicago Union Traction Co.

Items.	Chicago City Ry.Co.	Chicago U. T. Co.	Combined.
Net Earnings From Operation of Cars, Per Tables 16 and 17	$ 2,224,231.54	$ 3,230,356.35	$ 5,454,587.89
Income From Other Sources	$ 43,884.68		$ 43,884.68
Chartered Cars		$ 4,264.65	
U. S. Mail		19,779.35	
Advertising		33,525.00	
Rents, Land & Buildings		49,703.06	
Rents, Tracks & Terminals		10,000.00	
Interest on Deposits & Loans		9,786.67	
Miscellaneous		14,335.07	141,393.80
	$ 2,268,116.22	$ 3,371,750.15	$ 5,639,866.37
DEDUCTIONS.			
Depreciation	$ 180,000.00		
Interest on Bonded Indebtedness, Now Retired	103,938.75		
General Taxes	237,018.00		
Dividend 9 per cent on $18,000,000 Capital Stock	1,620,000.00		$ 2,140,956.75
Taxes		$ 614,416.93	
Interest on Loans		117,784.20	
Premiums on Bonds Purchased		2,397.04	
Bond Interest		1,250,740.00	
Rentals on Stocks		1,633,939.66	$ 3,619,277.83
Surplus	$ 127,159.47		
Deficit		$ 247,527.68	$ 120,368.21

PAYMENTS TO THE CITY.

Complying with the provisions of certain ordinances under which it is operating, the Chicago City Railway Company pays annually as follows:

For paving and maintaining between curb lines and intersections where its tracks cross boulevards.

For the entire expense of cleaning and maintaining the pavement between curb lines on Thirty-Fifth Street between Michigan and Grand Boulevards.

For the entire expense of cleaning and maintaining the pavement between curb lines on Forty-seventh Street from Drexel Boulevard to Lake Avenue.

For the entire expense of cleaning and sprinkling between curb lines, Wentworth Avenue from Archer Avenue to Thirty-ninth Street.

For one-third of the expense of cleaning and sprinkling between curb lines, Indiana Avenue from Eighteenth Street to Thirty-ninth Street.

For paving and maintenance of same, of the 16 feet where double track is laid and 8 feet where single track is laid, of the entire Right of Way, amounting to $173,278 in 1901.

For the expense of sprinkling its entire system of tracks from May 1 to October 1 each year, amounting to $7,047 in 1901.

For the use of the City Lighting Department, $10,000 per annum.

A license fee of $50 per car per annum, amounting to $26,212 in 1901.

Total of above expenditures being $216,537, or nearly 1 per cent of the gross receipts of the Company from all sources. The foregoing amounts are fixed charges, but do not include taxes.

The Chicago Union Traction Company pays annually as follows:

For maintenance of Adams Street, Lake Street, Division Street, North Avenue and Chicago Avenue Bridges, $3,000 per annum.

For the several items under ordinances not itemized, $30,000 per annum.

A license fee of $50 per car per annum, amounting during fiscal year ending June 30, 1902, to $34,892.87.

For the expense of sprinkling its entire system of tracks from May 1 to October 1 each year, amounting to $10,065 for year ending June 30, 1902.

For paving and maintenance of same, of the 16 feet where double track is laid and 8 feet where single track is laid, of the entire Right of Way, amounting to $109,841.19 in year ending June 30, 1902.

Total of above expenditures being $187,799.06, or slightly over one-half of 1 per cent of the gross receipts of the Company from all sources.

The foregoing amounts are fixed charges paid annually, but do not include taxes.

Exhibits have been made of numerous items covering repairs to pavement, repairs to bridges and viaducts, and subscriptions to cost of track elevation and construction of viaducts; but as these items are paid only as the occasion arises and cannot be construed as an annual fixed charge, I have not attempted to report them.

CAPITALIZATION.

Tables 19, 20 and 21 show the underlying indebtedness assumed by and capitalization of the Chicago Union Traction Company, with the annual fixed charges and the deductions from same due to the retirement of stocks under the several leases.

The total capitalization of the Chicago City Railway Company is represented by its Capital Stock of $18,000,000, on which it is paying at the present time 9 per cent Annual Dividends, or $1,620,000. This rate or amount is in no manner guaranteed, but is subject to change according to the successes or failures of the Company.

UNDERLYING INDEBTEDNESS ASSUMED BY AND CAPITALIZATION OF THE CHICAGO UNION TRACTION COMPANY.

TABLE NO. 19.

Chicago West Division Railway Co.—	Amount.	Annual Fixed Charges.
1st Mortgage 4½ per cent Bonds Due July 1, 1932......	$ 4,016,000	$ 180,720
Capital Stock (Under Lease to W. C. St. R. R.) 35 per cent	1,250,000	437,500
Chicago Passenger Railway Company—		
1st Mortgage 6 per cent Bonds Due Aug. 1, 1903........	400,000	24,000
Cons. Mortgage 5 per cent Bonds Due Dec. 1, 1936......	1,306,000	65,300
Capital Stock (Under Lease to C. W. D. Ry. Co.) 5 per cent	1,340,300	67,015
West Chicago Street R. R. Company—		
1st Mortgage 5 per cent Bonds Due May 1, 1928........	3,896,000	194,800
Cons. Mortgage 5 per cent Bonds Due Nov. 1, 1936.....	6,104,000	305,200
Debenture 6 per cent Bonds Due Dec. 1, 1914..	497,000	29,820
Mortgage on Power House Property 5 per cent........	184,000	9,200
Capital Stock (Under Lease to C. U. T. Co.) 6 per cent.	13,189,000	791,340
West Chicago Street R. R. Tunnel Co.—		
1st Mortgage 5 per cent Bonds Due Feb. 1, 1909.......	1,500,000	75,000
Total, West Side System........................	$ 33,682,300	$ 2,179,895

TABLE NO. 19.—Continued.

North Chicago City Railway Company—	Amount.	Annual Fixed Charges.
1st Mortgage 4 per cent Bonds Due July 1, 1927	$ 500,000	$ 20,000
2nd Mortgage 4½ per cent Bonds Due April 1, 1927	2,500,000	112,500
Capital Stock (Under Lease to N. C. S. R. R. Co.) 30 per cent	500,000	150,000
North Chicago Street Railroad Co—		
1st Mortgage 5 per cent Bonds $1,500,000 Due July 1, 1906, 1,250,000 Due Jany. 1, 1909, 421,000 Due Jany. 1, 1916	3,171,000	158,550
Cons. Mortgage 4½ per cent Bonds Due Apr. 1, 1931	1,614,000	72,630
Mortgage on Real Estate 6 per cent	15,000	900
Capital Stock (Under Lease to C. U. T. Co.) 12 per cent	7,920,000	950,400
Total North Side System	$ 16,220,000	$ 1,464,980
Total Assumed by Union Traction Co	$ 49,902,300	$ 3,644,875
Chicago Union Traction Company—		
Capital Stock, 5 per cent Cumulative Preferred	$ 12,000,000	$ 600,000
Capital Stock, Common	20,000,000	
	$ 32,000,000	
Grand Total	$ 81,902,300	$ 4,244,875

TABLE NO. 20.

Deductions From the Underlying Indebtedness Assumed by The Chicago Union Traction Company.

Capital Stock of the Chicago West Division Ry. Co. (Drawing 35 per cent Annual Dividends Under Lease With the West Chicago St. R. R. Co.) Deposited With Trustee, the Increment From Which is to be Used to Purchase and Retire 1st Mortgage Bonds of the Chicago West Division Ry. Co	$ 625,100	$ 218,785
Capital Stock of the Chicago Passenger Ry. Co. (Drawing 5 per cent Annual Dividends Under Lease With the Chicago West Division Railway Co.) in Hands of Trustee, the Increment From Which is to be Used Toward Payment of Interest on 1st Mortgage Bonds	730,000	36,500
Capital Stock of the West Chicago St. R. R. Co (Drawing 6 per cent Annual Dividends Under Lease With the Chicago Union Traction Co.) in Hands of Trustee, the Increment From Which is to be Devoted to the Interests of the Chicago Union Traction Co	3,200,000	192,000
Total West Side System	$ 4,555,100	$ 447,285

TABLE NO. 20.—Continued.

	Amount.	Annual Fixed Charges.
Capital Stock of the North Chicago City Ry. Co. (Drawing 30 per cent Annual Dividends Under Lease With North Chicago St. R. R. Co.) Deposited With Trustee, the Increment From Which is to be Used for the the Purpose of the N. C. St. R. R. Co.	$ 250,100	$ 75,030
Capital Stock of the North Chicago St. R. R. Co. (Drawing 12 per cent Annual Dividends Under Lease With Chicago Union Traction Co.) Deposited With Trustee, the Increment From Which is to be Devoted to the Interests of the Chicago Union Traction Co.	2,000,000	240,000
Total North Side System	$ 2,250,100	$ 315,030
Total Deductions for Both Systems	$ 6,805,200	$ 762,315

TABLE NO. 21.

SUMMARY OF CAPITALIZATION.

	West Div. System.	North Div. System.	Total.
Bonds	$17,903,000	$7,800,000	$25,703,000
Stocks	15,779,300	8,420,000	24,199,300
	$33,682,300	$16,220,000	$49,902,300
Deductions	4,555,100	2,250,100	6,805,200
Net total	$29,127,200	$13,969,900	$43,097,100
Chicago Union Traction Co. preferred stock		$12,000,000	
Chicago Union Traction Co. common stock		20,000,000	
			32,000,000
Net total capitalization of Union Traction System (excluding Consolidated System)			$75,097,100

SUMMARY OF ANNUAL FIXED CHARGES.

	West Div.	North Div.	Total.
Guaranteed stock dividends	$1,295,855	$1,100,400	$2,396,255
Less deductions	447,285	315,030	762,315
Net guaranteed stock dividends	$848,570	$785,370	$1,633,940
Bond interest	874,840	363,680	1,238,520
Interest real estate mortgages	9,200	900	10,100
	$1,732,610	$1,149,950	$2,882,560
5 per cent cumulative dividends on Union Traction preferred			600,000
			$3,482,560

PART IV.

THROUGH ROUTES, UNIVERSAL TRANSFERS, AND THE ONE-CITY-ONE-FARE QUESTION.

Treating of the Relative Merits of Operating Cars Over Through Routes as Compared with Down-Town Terminals.—Discusses the Subject of Universal Transfers and the Question: Could a Unified Company Afford to Conduct the Transportation Business of Chicago on a One-Fare Basis?

Reporting on that portion of your Committee's requirements relating to the joint use of tracks by all Companies; the unrestricted use of transfers between all Companies, and the relative merit of through routes as against down-town terminals with transfer privileges, to the end that the traveling public be carried for one fare within the confines of the territory served by the Chicago City Railway Company and the Chicago Union Traction Company and its affiliated Companies, I beg to submit the following.

There seems to be a great unanimity of sentiment as to the desirability of securing for the citizens of Chicago, in the adjustment of the transportation question, one fare within the limits of the territory served by the Companies at present affected by the expiration of franchises. While this is the prevailing sentiment, no one, to my knowledge, has advanced any definite ideas tending to bring such a condition about that are not open to serious objections on the part of either the Companies or the people. It is argued by some that the cars of one Company should traverse the tracks of the other Companies, thus giving through, continuous service between divisions, without change of cars or the use of transfers. Others, who have given the detail of operation a little more thorough study, are convinced that this method is impracticable from an operating standpoint, and favor the unrestricted exchange of transfers between companies to accomplish the desired end. Still others are of the opinion that the end cannot be accomplished without a consolidation of management on some basis that will do away with the necessity of accounting between Companies.

THROUGH ROUTES.

In Steam Railroad operation it is a common practice for the cars of one Company to utilize the trackage of another entirely separate Company for the purpose of perfecting more desirable routes, and passengers and freight originating in the territory of the conceded trackage are hauled by the concessionaire Company indiscriminately. In such cases it is an easy matter to account the business done, as all business is done at fixed station points only, subject to the supervision of the conceding Company.

In Street Railroad operation the conditions are different. Passengers are received and discharged at every street intersection, some riding through the territory of both Companies, others riding only in the territory in which they originated, with absolutely no method of checking possible for either Company. It may be argued that there should be no necessity of accounting between Companies; that each Company might run an equal number of cars on a certain line and that each Company might retain its receipts. This would be equitable if each territory contained an equal amount of the mileage of the line,—if the population served by the line in both territories were of equal density and if the travelling propensities of the residents of each territory were equal;—otherwise grave injustice would be done to one of the Companies. Another plan might be proposed, viz.: At the point where the car left one territory and entered the other a representative of each Company might be present to take a reading of the fare register, and make a count of the passengers aboard and make settlement between Companies on the figures thus obtained. While this plan would adequately protect each Company in its gross receipts, the expense attached to the conduct of such a plan and the time employed in completing the transaction, congesting, as it naturally would, the point at which the transaction occurred, and causing delay to the passengers on the car, would make it practically prohibitive. In either of the foregoing plans it would be difficult to fix the liability in case of accidents.

A third plan might be suggested. At the point where the car left one territory and entered the other crews could be changed, each Company's employes retaining fares collected, and a count of passengers aboard be made and an adjustment of differences be had at the end of the day. This method would take care of the question of accident liability and equitably adjust receipts between Companies; but the passengers would suffer constant and serious delays from the failure of crews to meet at the designated point, for change, on account of the constant interruption of car traffic from various causes.

These are the chief arguments which will be urged by the Companies against the extending of the privileges of one fare by means of the through route method of car operation under divisional ownership.

I recognize the great desirability of conducting transportation facilities along the lines of through routes through all divisions, and after having given the question a great deal of investigation and consideration I am of the opinion that it can be done in a practicable and equitable manner provided your Committee should see fit to require it after considering it in connection with the other subject matter in this report.

One method of accomplishing it, and to me a comparatively simple one, would be to equip each car with two cash fare registers. One register would be used to record all fares originating on a south-bound car south of any fixed line in the business district, say Monroe street, and on the same car when north bound to the same line (Monroe street).

From this point the use of the first register would be discontinued, by locking it or otherwise, and the other register brought into use. All fares originating north of Monroe street on the car when north bound, and all fares collected on the same car when south bound, as far as Monroe street, would be recorded on this register. On reaching Monroe street the use of it would be discontinued and the other register again brought into use.

I believe that this principle could be applied in such a manner as to fully meet all conditions. If this plan should not be satisfactory to the companies, I am quite sure that they would soon agree upon some other method of accomplishing the object if conditions made it necessary.

UNIVERSAL TRANSFERS.

In reference to the method of an unrestricted exchange of transfers to accomplish the desired end of one fare within the limits of the territories served by the two Companies.

Operation under this method would be equitable to both Companies if the average length of haul in the two territories were the same. The average length of the present routes operated by the Chicago City Railway Company is *10 37-100* miles, the average length of routes in the West Division is *8 57-100* and the average length in the North Division is *6 50-100* miles, or a Grand Average for the Union Traction Company's system of *7 69-100* miles. It will be seen from this that the probable average ride for all passengers hauled by the Chicago City Railway Company on transfers issued by the Union Traction Company would be 2 68-100 miles longer on the lines of the former Company than it would be for passengers hauled by the Union Traction Company on transfers issued by the Chicago City Railway Company. If the lines of the Chicago Consolidated Traction Company were included in the transfer system of the Union Traction Company the average length of routes in the Union Traction Company territory would more nearly approximate the average of the Chicago City Railway Company's routes.

The combined population of the North and West Divisions, comprising the territory of the Union Traction Company, is greatly in excess of the population of the South Division, the territory of the Chicago City Railway Company, consequently the initial travel from the Union Traction Company's territory to the territory of the Chicago City Railway Company would be greater than the initial travel from the Chicago City Railway Company's territory to the territory of the Union Traction Company; but each Company would get the cash fare on the return trip, thus equalizing the total business done by both Companies.

The method of settlement between the two Companies would be to pay cash, at the rate of 5 cents for each transfer presented by one Company in excess of the transfers presented by the other Company. This method of operation is feasible and comparatively equitable as between Companies; but, in operation, on lines terminating in the business center, it would be exceedingly unsatisfactory to the travelling public, as no system of loops would converge at one point without creating a large number of grade crossings between loops, thus materially diminishing the terminal capacity of the district and producing great congestion. The holder of a transfer from one line to another in the business center would be compelled to walk from one to four blocks to reach his car.

Of course it is true that at the *present time,* under the double fare system, passengers desiring to utilize both systems are compelled to walk certain distances in changing from one system to the other, and consequently this argument against the transfer method of accomplishing the end of one fare between divisions is without effect; but in devising methods for the accomplishment of the desired end the effort should be made to eliminate as far as possible the disadvantages under which the travelling public is at present laboring—and if the *great* disadvantage to the passenger, of having to walk several blocks in order to complete a trip between divisions for one fare, cannot be eliminated in the adoption of the transfer method, then some other method than the transfer method should be adopted.

While the interchange of transfers between Companies and the method of accounting and settlement would be comparatively equitable as between Companies, both Companies would be subjected to the great loss from traffic in transfers which would inevitably follow the issuing of transfers for use in the business center. As has been shown, about 80 per cent of the total travel is to and from the business center. It is probable that a large percentage of the travel between divisions is via the business center, as under the present arrangement of trackage there is only one street outside of the business center on which the lines of the two Companies connect, viz.: Halsted Street. On all other outlying streets a distance of over a half a mile intervenes. No loss would be sustained if every passenger receiving a transfer used the transfer himself to complete his trip between divisions, but the loss would be sustained when one person received a transfer and gave it or sold it to another person, who used it on the connecting line, thus enabling two persons to ride for one fare. That this is done at the present time within the confines of the individual Companies under the limited opportunity afforded is a well-known fact, and the opportunity would be enormously increased by the introduction of transfer points in the business center. There does not seem to be any way of stopping this traffic in transfers. There may be some way devised in the future to overcome the difficulties surrounding the use of transfers to permit extending the privilege of one fare between divisions, but I am constrained to admit that at the present time I cannot devise any plan applicable to a business center surface terminal system that will overcome the objectionable features to the travelling public and completely conserve the interests of the operating Companies.

The nearest approach to a practicable solution of this difficulty is to station transfer agents at certain points within the business district where the different lines intersect, although this would not entirely prevent the misuse of transfers.

JOINT USE OF TRACKS.

In reference to the joint use of tracks in the business center for terminal purposes.

There should be no difficulty in arranging terminal facilities. Under the plan for terminals recommended, as per Map No. 2, each loop is independent, consequently there would be no joint use of tracks. Map No. 3 shows a plan for accomplishing the same object by the joint use of tracks. Each Company should give up its present trackage rights in the business district and accept new grants on a plan best suited for the accommodation of the passengers from each division. *No value can be attached to trackage rights in the terminal district that cannot be profitably utilized for terminal or through route purposes.*

Part 5 of this report treats of the third method of accomplishing the desired end of one fare within the territories of both Companies under a unification of ownership or management.

CAN PASSENGERS BE CARRIED PROFITABLY WITHIN THE CITY LIMITS ON A SINGLE FARE BASIS?

We now come to the consideration of the question: Could a Company afford to conduct the transportation business of Chicago on the basis of a single fare?

In the absence of a practical demonstration, any answer to this question must be considered as a matter of opinion. The extreme distance served by the two Companies combined is embraced by Seventy-ninth Street on the South and Devon Avenue on the North, a distance of about 17 miles. If every passenger travelled this distance, the answer would emphatically be, No! The answer would be the same if every passenger travelled one-half of this distance.

As is shown by population map No. 7, herewith submitted, the dense population of the city is located North of Fifty-fifth Street, East of California Avenue and South of Diversey Boulevard. The territory within these boundary lines is well served by the surface lines, and the transportation of a large percentage of its population is done by the surface lines. The population outside of these boundary lines seeks other means of transportation to the business center where it is possible, owing to the distance and the quicker time that Elevated and Steam Roads make. The extreme distance North and South within these boundary lines is only 10 miles, a less distance than it is now possible to ride on either of the Companies lines for one fare. If every passenger rode the extreme distance that it is now possible to ride on either Company's lines, the present fare would not be sufficient, but because only a small proportion of their patrons avail themselves of the extreme privileges allowed by the companies they are enabled to extend them. In my judgment the same would be true if the privileges were extended to the entire territory embraced by the lines of the two Companies, and the travel between divisions that would be induced by the extension of these privileges would compensate for the loss in double fares between divisions at present in force. The fact must be recognized that about 80 per cent of the whole present travel from all divisions on the surface lines is to and from the business center, and the extension of the privilege of one fare between divisions would not appreciably alter this fact.

The cost of operation attendant on such an extension of privilege would not be materially greater than it is at the present time. The same total number of cars that are in operation at the present time would do the same amount of business as they do now. They would be differently distributed under a unified operation, but no more would be required to furnish to all parts of the combined territory a service equal to that being furnished now. If the privilege of one fare were extended to the whole territory embraced by the two Companies, and the concession was accomplished by the giving of transfers, it can be readily seen that the number of cars would not have to be increased, as the same people that would get the benefits of the transfer are now riding and paying for the privilege. An increase in cars, and consequently an increase in operating expenses, would only come when the extra travel induced by the concession required more cars, and then the Companies could afford to furnish the cars.

As will be shown in Part 5 of this report, which outlines a plan of operation under a unification of control, operating for one fare within the city limits, practically the same service that is being given at the present time can be given with 200 cars less than are now in operation, owing to the increased speed obtained by the change of the Cable lines to Electric and the greater facility of operating under continuous through routes as against the present Divisional operation. To this saving can be added the saving that would accrue from a reduction in administration and superintending expense through the maintenance of only one organization.

It is my opinion, after a careful canvas of the matter, that *a unified Company could afford to furnish transportation facilities to the entire territory* embraced by the lines of the Chicago City Railway Company, the Chicago Union Traction Company and the Chicago Consolidated Traction Company *within the city limits for a single fare,* and I am also of the opinion that companies operating under Divisional ownership or management could, if properly protected against the fraudulent use of transfers, grant the same privilege, but at a slightly increased expense to themselves over what it would be to a unified company. Furthermore, I believe that no one thing that could be done for Chicago would tend more to enhance its growth and prestige than the securing of such a concession in the settlement of the transportation question.

PART V.

DISCUSSION OF A NEW, REORGANIZED AND UNIFIED SYSTEM OF STREET RAILWAYS FOR CHICAGO.

Recommendations for a General Plan of Surface Transportation Under a Unification of Control of the Chicago City Railway Company, the Chicago Union Traction Company, the Chicago Consolidated Traction Company and the Chicago General Railway Company, Utilizing Subway and Surface Terminals in the Business District and Routing Cars Through All Divisions.—Embodies General Plan of Subways Required for Such Operation and Outlines the Use of Transfers.—Gives Schedule of Routes Recommended, Showing Length of Routes, Time, Number of Cars and Headway of Cars.—Gives Schedule of Streets on Which Tracks Should be Built in the Creation of Such a System, Showing Distance and Type of Track Construction.—Submits Estimates of Cost to Produce the System Ready for the Operation of Cars and an Estimate of the Earnings to be Derived from the Operation of Such a System, Based on the Past Performances of the Present Companies.

I have been asked to formulate a plan of surface transportation for Chicago, treating the situation as if all Divisional lines were eliminated and as if the Chicago City Railway Company and the Chicago Union Traction Company were under one ownership and one operating management,—transporting passengers for one fare throughout the territory at present served by both Companies. It has been previously said in this report that this would be the ideal condition for Chicago's citizens and also that a unification of management of these Companies was a condition that must be precedent to any *really satisfactory and permanent* solution of the transportation problem.

RELATION OF UNIFICATION TO THE SUBWAY QUESTION.

If subways were built for the accommodation of cars operated under the present Divisional plan with the eliminating of grade crossings held in mind, the subway system would naturally consist of a number of small loops, disconnected, and entering from each Division. With such a system of subways once installed, the realization of an ideal system of inter-division transportation would be indefinitely postponed. The desire for a system of subways in Chicago has arisen on account of the congested condition of the streets in the business district, and if built, they should be built on a plan designed to reduce the congestion to the minimum and at the same time render the most service to the travelling public, and with a view to the future good of the city. The congested area is embraced between the River on the North and West and Twelfth Street on the South. The distance between the River on the North and Twelfth Street on the South is about twice as great as the distance between the River and the Lake. The deflection to the East in the course of the River, between Harrison and Sixteenth Street, narrows the neck of land leading to the South Division, so that the highways between the business center and the South Division are very much choked between those points. Logically, subways designed to avoid and decrease congestion should pass through the longway of the congested district in order to perform the greatest service.

Following this course of reasoning, my recommendations are for North and South subways between Fourteenth Street and Indiana Street, and in one plan hereinafter outlined, with connections to the two tunnels at present leading to the West Division, as more fully set forth in the following plan for a transportation system.

While Chicago is a city primarily laid out on the radiating plan, owing to the course of the Chicago River, the system adopted in annexing adjacent territory has given it a lake frontage of about twenty-one miles, and an additional four and one-half miles South from the Lake Shore along the Indiana State line, making a total distance North and South within limits of twenty-five and one-half miles,—its width varying from six to eleven miles. The extreme limit of the territory at present embraced by the lines of the Chicago City Railway Company and the Union Traction Company is Seventy-ninth Street on the South, nine miles from Madison Street, and Devon Avenue on the

North, eight miles from Madison Street, an extreme distance of seventeen miles.

GENERAL PLAN OF OPERATION UNDER UNIFIED MANAGEMENT.

For a general plan of transportation within these limits, and to meet the requirements laid down by you in my commission to "eliminate grade crossings and provide for operation of through lines between the North and South Sides of the city through the business center, and in conjunction with the loop terminals from all divisions," the following is submitted. While this plan accomplishes the results required as above set forth, there are other conditions to be considered which might not make this plan the most practicable for adoption at the present time, and I submit in conjunction herewith other plans which will be subsequently considered.

The north and south tracks of the three divisions, at present built, including those west of the river, should be connected, and through north and south lines of cars be operated on each street, these lines to be designated the "Trunk System."

Upon the east and west tracks of the three divisions, at present built, through east and west lines of cars should be operated on each street, these lines to be designated the "Cross-Town System."

Upon the diagonal avenues radiating from the business center and paralleling the north and south branches of the Chicago River, there should be operated lines of cars between the northeast and southwest, and between the southeast and northwest sections of the city, *through the business center,*—designated the "Avenue System."

In recognition of the fact that the business center is the objective point of a very large proportion of the city's travel, especially morning and night, whatever service was found necessary to augment the service above set forth should be operated, as at present, from all divisions, terminating in the business center.

To serve the local travel in the business district, and distribute and transfer passengers arriving at depots, tracks in the down-town district should be so arranged as to connect all the depots, and lines of cars be routed and operated continuously in that district, independent of any of the foregoing systems. This local system should issue and receive transfers to and from any and all lines entering the business district

There is no question, in my opinion, but what a sufficient number of cars of proper design, properly routed, and operated judiciously, under adequate headway, on this general plan, would give to the citizens of Chicago a system of transportation that would only be excelled in cities where elevated, underground and surface systems exist under one control, and are all used to equalize time and distance within the city limits.

If it were possible to incorporate the elevated system into this general plan of transportation, operating the elevated cars within certain prescribed districts, adjacent to the business center, as express lines only, and using the crossing surface lines outside of that boundary as feeders to the elevated lines, the residents of the outlying territory would be brought as close to the business center, in point of time, as the more favorably located residents of the territory directly contiguous to the business district, served by the surface system only; but as the problems submitted to me contemplate only a rearrangement of surface transportation, ultra-ideal conditions must be dismissed from consideration and the most ideal conditions of which the situation is susceptible be evolved.

Under the operation of the north and south trunk system and the east and west cross-town system of cars, with a reasonable use of transfers, residents of any portion of any division at present served by the lines of the divisional companies would be enabled to reach any portion of any other division.

Under the operation of the avenue system, residents of the northwesterly portion of the city—that district farthest removed from the easterly portion of the South Division—would be enabled to travel over the least distance, and thus avail themselves of the benefits designed at the time of the creation of the avenues. The same is true as regards the residents of the southwesterly portion of the city in relation to their travel to the easterly portion of the North Division. There does not seem to be any demand for through lines of cars passing through the business center, between the central portions of the West Division and the North and South Divisions. There would be nothing gained in point of distance by the establishment of such lines, and time would be lost, owing to the congestion incident to the business district. The other sides of the rectangles could be used to better advantage. Should experience develop the necessity of such routes, they could easily be inaugurated without changes in the subway system.

Under the operation of the separate and distinct system of cars in the business center, free and easy intercourse between railroad stations and between all points of the down-town district would be established, an end much to be desired. This operation could be extended in the future, as the district became enlarged—which enlargement will certainly follow the rearrangement of street-car service on the above outlined plan.

By using this "Business Center System," as a distributing and collecting agency, the necessity of large loops is eliminated, and the limited area suitable for terminal facilities can be utilized to its fullest capacity. By the operation of such a distributing system the through service on the north and south trunk tracks can be taken through the business center in subways under streets most suitable, without reference to any local points, and the terminal loops of the east and west cross-town system and of the avenue system can be located with reference only to the highways over which they enter the business district.

One of the fundamental principles in conducting transportation is to give through traffic the right of way, or to route it in the channel of least resistance, over the shortest distance. The through service on the plan outlined will be on the north and south tracks and on the avenue tracks. Over the easterly north and south tracks which traverse the business center. will be routed the avenue traffic.

SUBWAY ROUTES.

Conforming to the fundamental principle above laid down, and recognizing that a large proportion of the through traffic will be conducted between the North and South Divisions contiguous to the Lake Shore, and over the Avenue lines, through the business center, the subway system of Chicago should consist of subways between Fourteenth Street and Indiana Street—under the north and south streets best adapted to serve the north and south through traffic, with east and west connections (See Subway Plan 1, Map 11) from the most westerly subway, to the two tunnels leading to the West Division, for the accommodation of the avenue through traffic. The avenue through traffic from the North and South Division should be routed—outside of the subway district—to the tracks leading into the most westerly subway. As quite a proportion of the traffic from the westerly portion of the South Division and from the West Division designed to terminate in the business center will naturally be brought in over the avenue lines, and from lines leading into the avenues, two subway loops for the joint use of this traffic terminating in the business center should be constructed, using the most westerly north and south subway for the east side of each loop. All other cars from the West Division and from the westerly portion of the South Division, should be brought into the business district over the bridges, and returned via *surface* loops. (See Map 10.) To provide terminal facilities for the divisional traffic of the North Division and that portion of the South Division lying east of Halsted street, terminating in the business center, a cross subway should be constructed in the center of the business district,—with reference to the north and south,—connecting all the north and south subways. This lateral subway, in connection with the north and south subways, would provide six loops, three for the North Division and three for the South Division traffic. To carry out this general plan it will be necessary to construct two more tunnels to the North Division to supply an outlet to the north for each transportation highway, entering from the south. By this plan the following results would be obtained:

First.—The greatest possible capacity of the limited area in the business district would be utilized for terminal facilities.

Second.—All through traffic via the business center would be taken through the congested district, underground, saving time to the passenger, and relieving the congestion in this district.

Third.—All subways would be on the high level without grade crossings, thus cheapening the construction and not interfering with existing low-level improvements.

Fourth.—All river tunnel approaches within the business center would be closed.

Fifth.—As all traffic from the North and South Divisions would be underground, if Surface Plan No. 1 (Map 10) were used, grade crossings of surface loops would be eliminated, except those incident to the operation of the local distributing system.

SURFACE TRACKS IN CONNECTION WITH SUBWAYS.

I am aware that the idea obtains in the minds of many that the installation of a subway system in the business district of Chicago will do away with all surface tracks in that district. While it is conceded that such a condition would be very desirable, it is impracticable to devise sufficient terminal capacity in a subway system in the limited number of streets embraced within the business district and avoid grade crossing in such subways, to accommodate all the traffic necessarily entering this business district, without adopting a high and low level subway system as hereinafter discussed.

Having arrived at this conclusion, it follows that whatever additional terminal facilities are required in the plan under discussion (Subway Plan No. 1 in combination with Surface Plan No. 1) not obtainable in a subway system must be arranged on the surface.

As the number of highways entering the business center from the south and available for street car operation is limited to three, and as the number entering from the north is limited to four, and as the natural trend of through traffic is in northerly and southerly direction, paralleling the water front and traversing the geatest distance within the city limits, it is naturally advisable to locate the subway system for the accommodation, primarily, of the North and South Divisions. As the three highways entering the business district from the south are not sufficient over which to bring all the traffic from the South Division a portion of it lying west of Halsted Street will have to be routed through the southerly part of the West Division, using West Division surface and subway terminals. There are seven bridges and two tunnels, making nine entrances from the West Division available for street car operation, and all of these entrances are required for the accommodation of the West Division traffic, and that portion of the South Division traffic that cannot be accommodated over the entrances from the south. The two tunnel entrances would lead to the two subway loops, and the seven bridge entrances would lead to seven surface loops. As has been shown, the east and west cross connecting subway, intersecting the north and south subways, would form six loops, thus making eight subway loops and seven surface loops, fifteen in all. More loops might be provided, but as a loop would be provided for each entrance, and as each loop would have the capacity of its entrance, more would be superfluous.

As there is quite a dense population, constantly increasing, in the North Division lying east of Clark street and south of Lincoln Park which will be poorly served by the north and south through lines, or by the divisional lines terminating on the subway loops, it would be advisable to extend the present North State street line from Division street to North avenue, on North State street, and operate it independently over the State street bridge, the fourth highway entering from the north and not utilized for either through traffic or terminal loop. This line should be taken south on State street to Twelfth street, over the tracks designed for the use of the business center distributing system, and returned over the same route.

Carrying out the general plan of east and west cross-town lines to the extreme limit, and observing the commonly accepted idea that all lines of cars should return as nearly as possible over the routes on which they enter, thus making the routing of cars more easily understood by strangers in the city, and to concentrate the terminals of all lines as near the center of the business district as possible, the following plan for the seven surface loops entering from the West Division is suggested as one surface plan, known as Surface Plan No. 1, and is shown on Map 10.

The routing would be as follows:

Lines entering over Lake Street Bridge:

East on Lake Street, south on Wabash, looping the block bounded by Wabash, Monroe, Michigan Avenue and Madison Street, returning via Wabash and Lake Street.

Lines entering over Randolph Street Bridge:

East on Randolph, south on State, looping the block bounded by State, Monroe, Wabash, and Madison Street, returning via State and Randolph.

Lines entering over Madison Street Bridge:

East on Madison Street, south on Dearborn, looping the block bounded by Dearborn, Monroe, State and Madison Streets, returning via Madison Street.

Lines entering over Adams Street Bridge:

East on Adams Street to Dearborn, looping the block bounded by Adams, Dearborn, Monroe and Clark Streets, returning via Adams Street.

Lines entering over Van Buren Street Bridge:

East on Van Buren Street to Dearborn, north on Dearborn Street, looping the block bounded by Adams, State, Monroe and Dearborn Streets, returning via Dearborn and Van Buren Streets.

Lines entering over Harrison Street Bridge:

East on Harrison Street to State Street, north on State, looping the block bounded by Adams, Wabash, Monroe and State Streets, returning via State and Harrison Streets.

Lines entering over Twelfth Street Bridge:

East on Twelfth to Fifth Avenue, north on Fifth Avenue to Polk, east to Wabash, via Peck Place, north on Wabash Avenue, looping the block bounded by Adams, Michigan Avenue, Monroe and Wabash Avenue, returning via Wabash Avenue, Hubbard Place, Polk Street, Fifth Avenue and Twelfth Street.

By this routing one side of each loop touches Monroe Street, which is near the center of the business district in reference to north and south. By locating the cross subway under Monroe Street, one side of each of the subway loops will touch Monroe Street.

BOULEVARD IN LA SALLE STREET.

Attention is called to the fact that by this arrangement of surface loops, all tracks—excepting those at street intersections—would be eliminated from La Salle and Washington Streets. As the south tunnel approach on La Salle Street would be closed, it would be possible to bridge the river at La Salle Street and give the North Division a boulevard entrance into and through the business center by connection with Jackson Boulevard and east on Washington Street to Michigan Avenue.

BUSINESS CENTER SYSTEM.

To best serve the purpose for which it is designed, the independent business center distributing system should be routed as follows:

Tracks should be arranged on Kinzie Street, State Street, Twelfth Street Viaduct and Fifth Avenue, forming a large loop for the operation of cars in both directions. A double track should be laid on Clark Street connecting—through the center of the loop—the north and south sides of the loop. A connection should be made with the loop at Kinzie and State Streets to serve the dock district north of the river and east of State Street. A connection across the loop at Polk Street would be made by the tracks of the West Division Twelfth Street loop, already provided. The State Street side of the loop should be connected with the Illinois Central Depot at Park Row and the Lake Front via Twelfth Street, Wabash Avenue and Hubbard Place. The tracks on the Twelfth Street viaduct should be connected with the tracks from the Illinois Central Depot. The Union Depot would be connected with this central loop by the tracks of the Adams Street West Division loop already provided. Over this system of tracks could be routed lines of cars connecting all the depots and serving each of the seven West Division surface loops at the three points of intersection of each loop,—viz.: State Street, Clark Street and Fifth Avenue. This distributing system should issue and receive transfers to and from all lines at all points of intersection.

While the operation of cars on this central loop would give fairly good service between depots, the ideal service would be obtained by a subway connecting all depots, operating independently of the subway system heretofore described, and designed primarily to transfer passengers and their baggage between stations. In the absence of a Union Station in a city the size of Chicago, where depots are so isolated, provision should be made for the transfer of passengers without mixing them up with the congested travel of the local population. To accomplish this in Chicago by the subway system, in connection with the plan now under discussion, it would be necessary to seek a lower level at a number of points to avoid interference with the subways of the city transportation system; but as the receiving and discharging points would probably only be located at the depots, it would be simple to install elevator service to reach the low level.

LOOP CAPACITIES.

Fifteen loops is the maximum capacity of the present highway entrances into the business center available for street car purposes, as has been shown. The following figures will demonstrate their use and show the capacity in reserve for future increase in population and business.

It has been shown in Part II that it is necessary to move to and from the business center in one hour 48,136 South Division passengers, 23,346 North Division passengers, and 40,821 West Division passengers, or a total of 112,302 passengers to be accommodated on the 15 loops provided.

The South Division passengers represent 42.86 per cent, the North Division 20.79 per cent, and the West Division 36.35 per cent of the total number.

The hourly capacity of any loop under a given headway is the carrying capacity of the number of cars that pass a given point on the loop in one hour.

Assuming 60 passengers to the car, a

30	second	headway	would	give	120	cars	capacity	1	loop	per hour,	7200	passengers
25	"	"	"	"	144	"	"	1	"	"	8640	"
20	"	"	"	"	180	"	"	1	"	"	10800	"
15	"	"	"	"	240	"	"	1	"	"	14400	"
10	"	"	"	"	360	"	"	1	"	"	21600	"

Under the apportionment of the loop capacity provided, on the foregoing divisional percentage, each division would have the following capacity:

	South Div.	North Div.	West Div.	Total.
30 second headway....................	46,396	22,464	39,240	108,000
25 " "	55,555	26,956	47,088	129,599
20 " "	69,444	33,696	58,860	162,000
15 " "	92,592	44,928	78,480	216,000
10 " "	138,888	67,392	117,720	324,000

It is thus apparent that with an operation of cars under a 30-second headway on the fifteen loops provided, the present traffic from each division could be taken care of and each division have an ultimate capacity of about three times as much business as is being done at the present time,—or the terminal facilities which would be provided under this plan would take care of a population of over five million people.

TRANSFER SYSTEM APPLICABLE TO THIS PLAN.

The use of transfers in the business center (outside of those to and from the independent distributing system) should be conducted in the same manner as at intersecting points between the trunk and cross-town systems in the outlying districts. Transfers issued by the east and west lines at their terminals in the business center should be in coupon form, the coupon to be retained by the ticket seller at the subway station gate and the transfer to be taken up by the conductor on the car and registered, the same as a cash fare.

The distributing system should be used to the fullest extent as such a system, and all lines of cars, whether passing through or terminating in the business center, should issue and receive transfers in connection with it. The transfers issued to the distributing system should be distinct from any other in use, and should entitle the holder to a ride in any direction on such system only, and the holder should not be entitled to further transfer. The transfers issued *by* the distributing system should be in coupon form. When this coupon transfer is presented at a subway station the ticket seller should examine it and, if in proper form, detach coupon, stamp the transfer, and return to holder for presentation to conductor on car. The conductor on car should register these transfers the same as cash fares. At the end of a day the total number of such transfers returned by conductors of subway cars should balance the ticket sellers' coupons. By this method the ticket seller has either cash or a transfer coupon to show for every person passing through his gate, and the conductor of each car has a subway ticket or a properly stamped transfer to show for each passenger boarding his car in the subway.

Tickets, good for the day only, should be sold at the subway station gate in order that the conductor should have either cash, subway ticket, subway transfer or transfer from outlying lines, to show for every passenger boarding his car.

When this coupon transfer is presented to the surface line conductor, he should detach and retain the coupon, and should the passenger be entitled to and desire further transfer, the conductor should properly prepare and return to the passenger the transfer ticket, to be held by him for further use on connecting line.

DISCUSSION OF A UNIVERSAL TRANSFER SYSTEM.

The fundamental principle which should underlie a satisfactory transfer system is that which will enable any passenger to go from any given point to within a reasonable distance of any other point within the city limits for a single fare, the passenger being carried by the shortest route and traveling always in the same general direction. Following out this general idea, I recommend a universal exchange of transfers between all of the street railway lines operating within the city limits, whether they run upon the surface of the streets or through future subways, with the exception of the lines operating on the street surface which converge and terminate within the business district at points where they intersect within this district. Passengers desiring to pass through the business district should take the through cars mentioned in this report.

Such a system can be put into effect without injustice to the street railways or to the public, provided a system of subways, as outlined in Plan No. 2 and Map No. 5, and discussed in Part VI, Page 148, is adopted, and operated in connection with a system of surface terminals as shown on either Maps No. 2 or 3.

In this case all through passengers and passengers desiring to traverse the down-town district, either locally or otherwise, should take the subway cars, for by the use of them the passengers would be able to reach any point within the business district without walking inconvenient distances. This would work no hardship upon the passengers who legitimately desired to avail themselves of the transfer privilege in this section, as a sufficient proportion of the cars from all lines operating into and through the business center would be operated through the subways.

Under this arrangement no transfers should be issued between the surface lines at points within the business district, except to the local distributing system.

Should subway Plan No. 1, shown on Map No. 11, be adopted, which does not provide a universal distributing system below the surface, the transferring of passengers in the business district would have to be done on the surface, and in this case some system of protection against the improper use of transfers at intersecting transfer points of the lines would have to be provided in order to prevent injustice to the railroad companies. As has been previously stated, the most feasible method known to me to accomplish this is to station transfer men at the intersecting points, but this method does not entirely prevent the improper use of transfers.

It is absolutely necessary, for the protection of any company operating such a liberal system of transfers as I have suggested, that there should be limitations as to the time in which the transfer may be used, and the direction in which the holder is allowed to ride. This would be equally true were the street railways owned by a municipality.

To accomplish this I suggest the adoption of the following system, which I believe has the essential feature of simplicity. This system is equally applicable where all the lines are operated under a single management or control, or where they are operated as separate companies, under the reconstructed conditions of subways and loops which I have outlined.

There should be transfers of three colors, and only three—green, red, and white; the green ticket to be issued by conductors upon cars going in a general northerly direction only, the red ticket by conductors going in a general southerly direction only, and the white ticket by conductors on all cross-town cars, by which is meant all east and west lines. The green ticket would entitle the holder to a continuous ride upon any cross-town line which intersected the line from which the holder originally obtained the transfer, and as a re-transfer north only upon any line which intersected the cross-town line. The green ticket would entitle the holder to ride north upon any intersecting line, whether cross-town or otherwise. This same principle would obtain with the red ticket going south. The white ticket, issued by a cross-town conductor, upon the payment of cash fare only, would be good either north or south on any intersecting line; a re-transfer to be issued to the holder of the white ticket if he so desired. If the holder of a white cross-town ticket presented this ticket on a north-bound car he would receive a green ticket, which would then limit his ride to cars going in that direction, and it would not be possible for him to make a circuit and return to or near his starting point. The green and red tickets would not be surrendered upon cross-town lines if the holder desired to re-transfer, but the ticket would be held and presented on the car to which the holder transferred from the cross-town line. If for any reason the operating company desired it, the red and green tickets could have attached to them coupons which could be taken up by the conductor of the cross-town line in all cases where the passenger desired a re-transfer. The holding of a transfer upon cross-town lines would be a convenience to the passengers and would greatly simplify the work of the conductors, and give them more time to perform their other duties. It is only through the holding of the transfer on the cross-town lines that a universal transfer system is practicable, for if the ticket should be surrendered there would be no way of telling from what direction the passenger came after leaving the cross-town line, unless another transfer should be immediately issued by the conductor, which would mean that he would be compelled to carry three sets of transfers,—white, red and green, which is highly impracticable, and nothing would be gained either by the passenger or the conductor, or some other elaborate system, such as the punching of directions; all such systems being prolific of confusion and misunderstandings between the passengers and the conductors. As many re-transfers should also be allowed passengers as they may desire, so long as the passenger continues in the same general direction. As an illustration: If a passenger boarded a car at Indiana Avenue and Forty-Third Street, and desired to go to a point on Western Avenue, north of Madison Street, he would obtain a green transfer from the conductor on the Indiana Avenue subway line, which he would present to the conductor of the Madison Street line for inspection, who would, after ascertaining that the passenger wished to re-transfer north, return him the ticket, which ticket would entitle the passenger to continue his ride north on the Western Avenue line.

The system which I have termed the distributing system for the purpose of this transfer system should be considered as a cross-line system. That is, the conductors should issue white transfer upon payment of cash fare only, and the green and red transfers presented upon this line should entitle the holder to ride upon this line only, with no re-transfer privilege. Wherever a point can be reached by a through car, no transfers should be given. That is, if a part of the Madison Street cars, as I have suggested, should be routed to go south on Robey Street, no transfer privilege should be allowed from west-bound Madison Street cars at Robey and Madison Street, good to go south. It would seem only reasonable that if the through service is given it should be accepted as a substitution of the transfer.

A similar system to the one outlined is in operation in New York City, where over 500,000 transfer tickets are issued daily, and has worked with remarkable satisfaction to the traveling public and to the street railway company.

In this connection I would recommend that there be posted conspicuously in all cars a statement outlining the transfer privileges to which the passengers are entitled.

COST OF THE NEW SYSTEM.

Cost Estimate No. 1, Page 231, gives the cost to produce a complete street railway system as described under this plan (exclusive of the cost of the subway system), constructed after the most approved practices, on which cars could be operated in the manner herein outlined. The streets on which such tracks should be constructed, and the amount of track of the different types, are shown in Appendix J, Page 296.

This schedule includes all streets within the city limits embraced in the systems of the Chicago City Railway Company, the Union Traction Company, the Chicago Consolidated Traction Company, and the Chicago General Railway Company that are necessary to the proper conduct of the transportation facilities designed in the foregoing plan, and also includes that portion of the tracks recommended to be built in Part II, Page 52 of this report, that are necessary to complete the system. The trackage for terminal facilities in the business center, as shown in Appendix J, would be on the streets and in subways as shown by Maps 10 and 11.

The plant for power production would be of the high-tension type, with sub-stations for transformation of the current to suitable voltage for the working conductors, the latest and best practice in vogue for such a system.

The cars would be of the closed, double-truck type, with reversible back cross seats, seating 52 passengers, equipped with power brakes and adequate motor capacity, and as this type is eminently suitable for summer operation, only one equipment would be necessary.

As the proper location for barns in which to house and from which to operate the cars would be at the extreme outlying ends of the several lines, the cost of real estate would be materially lessened. As the power-house site for an economical distribution of current should be centrally located and contiguous to an ample supply of water and fuel, dock property, near the business center, with adequate steam-road connections, should be provided. The sub-stations would only require ordinary residence lots, located from two to six miles from the power house.

It is believed that the several amounts named for cost of real estate, while conservative, are ample to acquire suitable property, and the prices on rolling stock and equipment are the ruling prices at the present time.

Cost Estimate No. 1, Page 231, shows as a total cost to produce an ideal system of street railways, as previously described in this part, exclusive of the subway proper, ready for operation, $69,800,000.

The track mileage embraced in this estimate is 220 miles in excess of the present mileage of the Chicago City Railway Company and the Chicago Union Traction Company combined, which is sufficient to include the present mileage in the city limits of the Chicago Consolidated Traction Company and the Chicago General Railway Company.

The gross earnings of the present companies should be materially increased in the operation of this completed system.

Such a system, built in the best manner known to the art, and on lines calculated for the most economical results, in operation, should show marked decrease in operating expenses from the expenses of the present companies, but basing the calculations on the last annual reports of the Chicago City Railway Company and the Chicago Union Traction Company, and such information as I have been able to obtain regarding the returns of the Chicago Consolidated Traction Company and Chicago General Railway

Company, the results shown in the following table would be obtained.

In the gross receipts from passengers and from other sources, is included the proportion of the receipts of the Chicago Consolidated Traction Company that the mileage of the company within the city limits bears to the total mileage owned by the company, which is 70 per cent. The information on which the total gross receipts is based, was derived from testimony of the auditor deduced in the case of the City Versus The Union and Consolidated Companies, relative to transfers.

Estimate of operation, for one year, of system above outlined, costing (exclusive of the subway system proper), $69,800,000, based on the past performances for one year of the Chicago City Railway Company, the Chicago Union Traction Company, the Chicago Consolidated Traction Company and the Chicago General Railway Company.

GROSS RECEIPTS FROM ALL SOURCES.

From passengers	$14,492,666.20	
From other sources	270,472.78	
		$14,763,138.98
Operating expenses 60 per cent of passenger receipts		8,695,599.72
Net earnings from operation		$6,067,539.26
Taxes as paid in the past		943,283.28
Net earnings per annum to be applied to interest on bonds and stock, maintenance of property, and to be set aside for sinking fund to renew the property, and for all other purposes incumbent upon the property		$5,124,255.98

PART VI.

TECHNICAL PROBLEMS, VALUATIONS AND ESTIMATES.

Chapter I., Subways.—Chapter II., Underground Electric Conduit System.—Chapter III., Electrolysis.—Chapter IV., Union Elevated Railroad Loop.—Chapter V.—Track Rails and Track Construction.—Chapter VI., Unit Price Estimates.—Chapter VII., Valuation Estimates.—Chapter VIII., Valuation of Lines Under Expiring Grants.—Chapter IX., Cost Estimates.

CHAPTER I.

SUBWAYS.

The problem relating to transportation subways in the business center of the South Side, as submitted to me by your Honorable Body, required the preparation of "preliminary plans for a system of Subways which, coupled with the surface system of terminal facilities, or operated independently and without such surface system, will adequately accommodate the traveling public, provide for an increase of traffic in the years to come, relieve the congested condition and create a larger area available for uses by all lines of business; these plans to show a feasible disposition of all existing underground improvements, so disposed of as to permit of easy access for future repairs, renewals and reinforcements without disturbing the street surface."

The treatment of these various divisions of the Subway matter is shown on Maps Nos. 5 and 11 and Plates numbered 1 to 9 inclusive.

As previously stated, I have arrived at the conclusion that it is impracticable to devise a system of underground transportation for the central down-town district, which will forever fully supply adequate terminal facilities for the very large traffic entering that district, and that any satisfactory system of terminals capable of meeting the future demands that will be required within the limited area available, must include a combination of surface and subway tracks.

ULTIMATE OBJECTS.

In the development of the subway plans submitted herewith there have been kept in mind the following principal objects:

First.—The ultimate unification of all street railway facilities within the city limits under a single operating management.

Second.—The proper location of the subway lines and the construction of a track system which will provide for the operation of cars under any of the following plans:

- (A) Between the various divisions of the city through the business district.
- (B) Divisional operation of the cars only; using the subway system as a loop terminal.
- (C) Plans (A) and (B) in combination.

Third.—To build the Subway as close to the surface of the street as possible; reducing the distance from station platforms to the level of the street to a minimum.

Fourth.—The arrangement of a subway system to provide for the maximum efficiency with a minimum length of underground tracks.

Fifth.—The disposition of all underground utilities in such a manner that they will be easily accessible without disturbing the surface of the street, and without any direct connection with the transportation subway.

The question of keeping as much of the Subway as possible close to the surface of the street being considered of prime importance, both in respect to greater convenience when completed, and the probable large saving in the cost of construction, it at once became apparent that in meeting the requirements of the committee in respect to the disposition of existing underground improvements the subject must be treated on the broad grounds that the entire width of a street between building lines is set apart for public uses and that wherever transportation subways are to be constructed in a street the space beneath the sidewalks must of necessity be used for the purpose for which it was originally set apart, i. e., the disposition of public utilities.

It may be said with propriety that all pipes and conduits in streets, especially those in the streets of business districts, should be placed in properly constructed galleries, to avoid the incessant disturbance of the street surfaces which existing methods necessarily entail. Wherever practicable these galleries should occupy the space beneath the sidewalk, and in preparing the drawings for subways this plan of disposing of the underground improvements has been followed.

SUBWAY ROUTES.

The location of Subways shown on Map No. 11, hereinafter referred to as Subway Plan No. 1, is suggested as the most feasible plan for accomplishing the foregoing objects without disturbing the existing low level improvements, which have been avoided by slightly increasing the grades of some of the tunnel entrances. The arrangement of the subways shown in this plan is believed to provide the greatest possible elasticity in respect to operation. It is in full harmony with all the suggestions herein made for re-routing cars. Adhering to the general plan of recognizing the North and South lines as the "trunk lines," and to arrange the track system in the subway and on the surface of the streets in a manner so as to practically eliminate grade crossings, it is proposed to take such North and South traffic as may hereafter be deemed advisable into and through the business district in the subway, except that portion of the traffic from the South Division of the city which may be routed over tracks in the Southerly portion of the West Division, via the West Division surface and subway terminals and such North and South traffic as may be thought best to retain upon the surface of the streets. Under this plan the North and South subways would be located in Wabash Avenue, State Street, Dearborn Street, Clark Street and partially in La Salle Street, and would extend from Fourteenth Street on the South to Indiana Street on the North.

In Wabash Avenue from Fourteenth Street to Hubbard Place the subway would be double tracked. From Hubbard Place to South Water Street a single track subway for North-bound traffic would be constructed under the Easterly roadway and sidewalk. The entire structure of the single track subway in Wabash Avenue would be East of and removed several feet from the substructure of the Elevated Railroad in the same street (see Plates 7 and 9), thence turning West in South Water Street as a single track structure to State Street, where the structure will again become a double track subway; thence continuing westwardly in South Water Street to Dearborn Street; thence North in Dearborn Street, passing under the river in a new double track tunnel and reaching the surface again at or near Indiana Street. This Subway could be carried, if it should be deemed advisable, under the river at or near Cass Street. The south-bound Wabash Avenue traffic between South Water Street and Hubbard Court would be taken through the subway on the easterly track in State Street.

The subway in State Street would be a double track structure from Fourteenth Street northwardly to Polk Street. From Polk Street to Hubbard Court this subway would be a single track structure, in which the north-bound traffic would cross to the westerly subway track in State Street. From Hubbard Court to Lake Street the subway in State Street would be a double track structure. At Lake Street the north-bound State Street track would curve into Lake Street and run westwardly in a single track subway to Dearborn Street, where the structure would again become double tracked and continue westwardly in Lake Street to Clark Street; thence north in Clark Street and under the river through a new double track tunnel, coming to the surface again at or near Indiana Street. The south-bound State Street traffic between Lake Street and Polk Street would be carried in Dearborn Street and via a single track subway in Polk Street to a connection with the south-bound track in State Street south of Polk Street.

The subway in Dearborn Street from Polk Street to Randolph Street would be a double track structure. The easterly track would be designed to carry south-bound State Street traffic and the westerly track north-bound Clark Street traffic. At Randolph Street the westerly Dearborn Street track would turn West into Randolph Street in a single track subway to Clark Street, where the structure would become double tracked, continuing westwardly in Randolph Street to LaSalle Street; thence North in LaSalle Street and under the river through the

LaSalle Street tunnel, the tracks coming to the surface again at or near Indiana Street.

The Clark Street subway would be a double track structure from Fourteenth Street to Polk Street. From Polk Street to Jackson Boulevard the South bound Clark Street track would be in a single track subway which would cross to the east side of Clark Street at Harrison Street. From Jackson Boulevard to Washington Street the Clark Street structure would be double tracked, the westerly track forming the easterly track of the two loop subways connecting with the Washington Street and the Van Buren Street tunnels for West Division traffic. The easterly track in Clark Street would continue northwardly in Clark Street to Randolph Street, where it would connect with the double-track structure in Randolph Street, leading to the La Salle Street tunnel. The westerly Clark Street track would connect at Washington Street with the single-track structure leading to the Washington Street tunnel. The north-bound track in Clark Street would turn east in Polk Street as a single-track structure and connect with the easterly track in Dearborn Street.

At Monroe Street double track cross connections with suitable curves would be made between the Wabash Avenue track and the easterly track in State Street, between the westerly track in State Street and the easterly track in Dearborn Street, and between the westerly track in Dearborn Street and the easterly track in Clark Street for the purpose of supplying the necessary loop connections for operating the cars of either the North Division or the South Division into the business district and return without reference to through traffic.

The subway in Washington Street would be a double tracked structure from Clinton to Market Streets passing under the river through a reconstructed Washington Street tunnel. The east-bound track would turn south in Market Street in a single track subway to Monroe Street; thence east in Monroe Street to Clark Street to a connection with the westerly track in Clark Street. The west-bound track would be a single track subway in Washington Street from Market Street to Clark Street, where it would connect with the westerly Clark Street track, completing the subway loop for traffic through the Washington Street tunnel.

The subway connecting with the West Chicago Street Railroad tunnel near Van Buren Street would be a double track structure in Market Street from a connection with the river tunnel to

Jackson Boulevard. The east-bound track would turn east in Jackson Boulevard as a single track structure to a connection with the westerly track in Clark Street. The west-bound track would continue in Market Street to Adams Street as a single track structure; thence in Adams Street to a connection with the westerly track in Clark Street, completing the loop for West Division traffic passing through the West Chicago street railroad tunnel. Curved connections would be provided between the two West Division subway loops and the north and south subways in Clark street to provide for through traffic via the subways between the West Division and the North and South Divisions of the city.

The length of subways to be constructed along the routes described, exclusive of the tunnels under the river, would be 20,825 lineal feet of double track structure and 20,000 lineal feet of single track structure.

The proposed subway construction is shown in the drawings accompanying this report. Plates 1 and 2 show typical cross sections of a double track subway in 80 and 66 foot streets. The cross section shown on Plate No. 1 represents the subway located above the large tunnel of the Illinois Telephone & Telegraph Company, and that on Plate No. 2 represents the subway above the small tunnel of the same company. Plate No. 3 shows a typical cross-section of a double track subway at a station. The normal section of the subway proper would be rectangular, with the tracks side by side, and consists of transverse bents of steel columns and roof beams, which would carry side walls and a roof of concrete arches and rest on a concrete floor. The side columns and the roof beams would be rolled I-beam sections and the central columns would be built up of angles and plates riveted together. The entire four sides of the section would be protected from seepage by a layer of water-proofing embedded in the floor, walls and roof.

As indicated on Plates Nos. 4 and 5, it is proposed to place the station entrance and exit stairways at the outer edge of the sidewalk space, the stairways leading down to a corridor located just inside the curb wall line, and opening onto the station platform, which would be 13 feet in width and about 150 feet in length. Wherever possible the stations should be located at street intersections with the platforms extending an equal distance each way from the center of the street crossing the line of the subway, and with a stairway leading down to the station from the subway street on each side of the intersecting street, as shown on Plate No. 4.

The walls and ceilings of all passageways leading to the station platforms and the walls and ceilings of the station should be finished in white glazed terra cotta or other equally attractive material.

In regard to the adoption of a proper cross-section for the subways: Since the principal function of the sub-surface tracks will be to serve as terminals for the traffic coming from the various street railways centering in the business district, the impracticability of considering the use of a special type of rolling stock for the purpose of contracting the area of the subways is obvious. With the development of mechanical propulsion of street cars there has been a steady increase in the size and weight of cars, and at the present time there are in service on some of the lines in this city cars which are more than eleven feet in height, exclusive of trolley stands, eight feet six inches in width, forty-seven feet in length and weighing fifty thousand pounds, exclusive of the live load. The cross-section of the subways has been fixed to provide for the operation of these large cars and the necessary clearances to insure safety to passengers and also to the force of employes which would be stationed in the subways for the purpose of inspection and repairs to the tracks.

The resulting interior dimensions of the subway would be as follows: Clear height above track rail, 14 feet 6 inches; clear width between side walls, 25 feet; clearance between the wall and the car, 1 foot 8½ inches; clearance between the central columns and the car, 1 foot 8½ inches; total distance between passing cars, 4 feet 3 inches.

The central space between the tracks would afford employes ample opportunity to seek shelter from passing trains. And where a line changed its direction the curves would be so laid that safe clearances between passing cars and between the cars and subway walls and columns would be maintained.

When detailed plans of a subway system are finally made they should provide for the operation of the longest and heaviest standard suburban cars that the curvature conditions will permit.

METHOD OF CONSTRUCTION.

Should the final plans for subways in the business district be developed in accordance with the suggestions contained in the preliminary plans submitted herewith, especially in respect to the proximity of the subways to the surface of the streets, it is evident that a large part of the work must be done by attacking the street from the top, the excavations and trenches being thoroughly sheathed and braced or strutted across to prevent any movement of the foundations of buildings abutting the street. As shown on Profile Map No. 12, the subways leading to the North and West sides of the city must pass under the Chicago River, with the tracks at the center of the stream approximately 43 feet below city datum. Assuming that the channel would be 24 feet deep, the inclination of the subways toward the river would be quite abrupt, and the structure for a short distance before reaching the stream would be at a depth below the surface where it may prove to be more economical and less dangerous to resort to tunneling without disturbing the surface of the street than to prosecute the entire work by the open cut method. This would also be true for the entire low level system of subways of Plan No. 2. By the use of a proper system of timbering for the surface excavation, the surface of the street may be planked over, and, to a considerable extent, be kept open to traffic during the construction period, but a certain amount of interference with the street traffic would be a part of the sacrifice to be made by the public to secure adequate transportation facilities within the business district and the permanent disposition of other underground public utilities in a manner to provide for their future maintenance or extension without disturbing the surface of the streets occupied by the subways.

The structural details of the sections of the subways as given by the drawings have been worked out sufficiently to demonstrate the entire practicability of constructing the tunnels in accordance with the general plans, the ability of the structure to successfully resist the stresses which would be produced by the loads to which it would be subjected, and to furnish sufficient information from which reasonably correct estimates of the cost of construction may be made.

The location of subway stations, as shown by Map Nos. 5 and 11, is merely a tentative treatment of the subject. Very considerable study will have to be bestowed on the situation in respect to the details of operating conditions on the various lines of railways, the demand for stations arising from local conditions at various points near the line of the subways, and some systematic arrangement of the stations to enable passengers to reach the cars of any subway line within the shortest possible distance from a given point. The depth of the platform floors below the street grade will vary with the variation in the gradients of the subways, the minimum depth being 18 feet 6 inches below the established grade of the street.

VENTILATION AND TEMPERATURE.

The electrical propulsion of cars in the tunnels will simplify the question of ventilation. Very little artificial aid would be required to make the conditions in this respect entirely satisfactory, and such artificial aid as may be necessary should be provided in such a way that, as the foul air was exhausted from the tunnels, fresh air would be drawn into them through the entrances to stations. In respect to the temperature which may be expected in the subways, the conditions observed in the Boston subways may with propriety be assumed to represent those which would obtain in subways constructed near the surface of the streets in Chicago.

The following are the temperatures observed and recorded in the Boston subway during the year 1900 and 1902, to and including the month of September of the latter year:

1900.

Month.	Highest.	Lowest.
January	47 deg.	31 deg.
February	48 deg.	30 deg.
March	46 deg.	32 deg.
April	58 deg.	39 deg.
May	69 deg.	52 deg.
June	78 deg.	63 deg.
July	82 deg.	72 deg.
September	74 deg.	60 deg.
October	63 deg.	54 deg.
November	54 deg.	42 deg.
December	50 deg.	23 deg.

1902.

January	44 deg.	20 deg.
February	42 deg.	21 deg.
March	44 deg.	34 deg.
April	64 deg.	40 deg.
May	67 deg.	56 deg.
June	76 deg.	69 deg.
July	77 deg.	66 deg.
August	79 deg.	69 deg.
September	72 deg.	61 deg.

The temperatures above recorded indicate that it would be entirely safe to dispose of water pipes and all other underground utilities within galleries situated as shown by the plans submitted with this report.

In respect to maintaining traffic on the various surface tracks during the construction of the subways: It is practicable to build the subways without serious interference with existing service. It would expedite operations in the construction of the subways and be less expensive if traffic were diverted from a street to the tracks in other streets during construction operations. Should such diversion of traffic be impracticable, service could be maintained during the construction period by underpinning, or by suspending the surface tracks over the subway excavation. The diversion of traffic from one street to another would be feasible if cable operation were abandoned and temporary arrangement made for electrical operation of cars in the business district.

The general matter in the foregoing discussion applies to both subway plans 1 and 2, although the routing of the cars would be changed corresponding to the changes in the streets, but the general results would be practically the same. For discussion of Subway Plan No. 2, see Page 148.

DRAINAGE.

In connection with the construction of the subways it is proposed to work out the drainage problem by the following methods:

All drainage east of and including the east side of Wabash Avenue to drain into the trunk line sewer in Michigan Avenue, as at present arranged. The existing main sewer in Michigan Avenue summits at Van Buren Street and descends thence northwardly toward the river and southwardly to the four-foot intercepting sewer which crosses Michigan Avenue at Twelfth Street; the elevation of the Michigan Avenue sewer invert at Van Buren Street being 3.15 feet above city datum and at its junction with the intercepting sewer at Twelfth street the elevation of the invert is .8 of a foot above the datum line. South of Twelfth Street the Michigan Avenue sewer again summits at the center of the block between Sixteenth Street and Eighteenth Street, where the elevation of the invert is 4.2 feet above city datum. From the latter summit the Michigan Avenue sewer inclines southwardly toward the intercepting sewer at Twenty-first street and northwardly toward the intercepting sewer at Twelfth Street. From the intersection of Michigan Avenue and Twelfth Street the intercepting sewer runs westwardly in Twelfth Street to State Street; thence southwardly in State Street to Fourteenth Street; thence westwardly in Fourteenth Street to the outfall at the river.

To provide for properly connecting the Illinois Central Railroad Station at Park Row with the down-town local surface transportation system without incurring interruption to the traffic operated through the north and south subways it is desirable to begin the descent into the southerly approaches to subways at or near Fourteenth Street; this would involve a re-location of the intercepting sewer from the intersection of Michigan Avenue and Twelfth Street to the intersection of State Street and Fourteenth Street. The new location suggested is as follows, viz.: Southwardly along the west side of Michigan Avenue from Twelfth Street to Fourteenth Street; thence westwardly in Fourteenth Street to a connection with the existing sewer in Fourteenth Street at the west line of State Street. This arrangement of the intercepting sewer would not involve any unusual methods in the rearrangement of the lateral sewers which discharge into the intercepting sewer.

Within the subway district it is proposed to provide a high level gravity system of sewers to take care of all house drainage at and above the first floor level. This gravity system would be proportioned to take care of storm water in addition to the house drainage. A low level sewer would be provided to take the drainage from the basement level of buildings and such drainage as may be required for the subway, pipe and electrical conduits, etc., etc. The low level drains would discharge into sumps or receiving wells advantageously placed to permit the low level sewage to be pumped up and discharged into the river (see Plates 1 and 2). It is proposed to construct the high level subways with their roofs as near to the surface of the ground as may be practicable. The minimum depth would occur at the summit points of the sewer system. The entrances to subway stations would pass under the high level sewer conduits and the minimum headroom required for these station entrances establishes the relation between the sewer invert and the outside of the subway roof. This relation between the elevation of the high level sewer and the elevation of the subway roof would remain constant throughout the entire length of the subways, as the gradient of the subway would be parallel with the gradient of the sewer, except where local conditions may demand a greater inclination of the subway (see Profile, Map No. 12). At the high level a separate sewer would be provided to drain each side of a street occupied by a subway. The low level drainage would be conveyed in a single sewer except where the subway would come above and parallel with the large-sized tunnel of the Illinois Telephone and Telegraph Company (see Plate No. 1). In the latter case the low level sewer would also be constructed to take the basement drainage from the buildings on each side of the street separately. As indicated on Map No. 12 for north and south through subways, the sewer parallel to these subways would summit at Monroe Street and drain northwardly toward the river and southwardly toward the intercepting sewer on Fourteenth Street. As the drainage area included in the district between Monroe Street on the north and Fourteenth Street on the south, Wabash Avenue on the east and Clark Street on the west, is much larger than that which now drains into the Fourteenth Street intercepting sewer, provision would have to be made for an additional outlet sewer in Polk Street. The subway, after crossing the "trunk" line tunnel of the Illinois Telephone and Telegraph Company in Harrison Street, would be depressed sufficiently to permit the outlet sewer to cross above the subway at Polk Street, the subway being allowed to rise again to normal depth below the established grade of the street at or near Taylor Street. The upper level drainage north of Monroe Street and between Wabash Avenue and Clark Street would be carried northwardly to the river. On account of the gradients which would be necessary to take the subway under the river it would be entirely practicable to build the upper level sewers north of Monroe Street on uniform gradients and carry them above the subway roof near the river and discharge them by gravitation directly into the river. Similar conditions will obtain in respect to the upper level drainage within the subway district west of Clark Street.

Reference has been previously made to the proposed method of disposing of the low level sewage by discharging it by gravitation into receiving wells so located as to permit of pumping the sewage up and discharging it into the river. The tunnels which would pass under the river and form the lowest level in the subway system would be the natural points to which the lower level sewage should be conveyed by gravitation.

Between Harrison and Fourteenth Streets the low level service drains within the subway district would be connected with the low level trunk drain running westwardly under Taylor Street to Fifth Avenue; thence northwardly under Fifth Avenue to Van Buren Street; thenee westwardly in Van Buren Street to Franklin; thence northwardly in Franklin Street about 165 feet to the entrance to the property of the West Chicago Street Railroad Tunnel Company. Thence into the receiving well of the pumping station.

The low level service sewers within the subway district between Harrison and Monroe Streets would be connected with a low level trunk line sewer in Van Buren Street running westwardly to a connection with the low level trunk line sewer at the intersections of Fifth Avenue and Van Buren Street. The low level service drains within the subway district north of Monroe Street would connect with a trunk line low level sewer conveniently located to convey the sewage to a pumping station situated at one of the tunnels passing under the Chicago river and connecting the North and South Divisions of the city.

WATER SYSTEM.

As a general arrangement of the Water Supply System within the subway district, it is proposed to install a belt of main feeder pipes to be connected with the various pumping stations which at present supply the district under consideration. From the belt of feeder pipes lateral supply mains would be projected, and wherever in the construction of the subway the present system of pipes would not be interfered with these pipes would be connected with the new feeder system in such manner as to provide for complete circulation of the water. It is proposed to lay the belt feeder system with pipes 36 inches in diameter, connecting at the junction of Washington and LaSalle Streets with the existing 36-inch main feeder from the Chicago Avenue Pumping Station, thence westwardly along the north side of Washington street to Market Street, where the roof of the subway would be a sufficient depth below the surface of the street to permit the water main to pass above it; thence southwardly in Market Street to the south side of Jackson Boulevard; thence eastwardly in Jackson Boulevard to Fifth Avenue, where connection will be made with the existing 36-inch feeder from the Harrison Street Pumping Station; thence continuing eastwardly in Jackson Boulevard to the west side of South Clark Street; thence southwardly in Clark Street to Harrison Street, where connection would be made with the 36-inch feeder which now connects the Fourteenth Street and Harrison Street Pumping Stations; thence continuing southwardly in Clark Street to Polk Street, where the roof of the subway would be at sufficient depth to permit the water main to pass above it; thence east in Polk Street and Peck Place to the west side of Wabash Avenue; thence southwardly in Wabash Avenue to Fourteenth Street; thence east in Fourteenth Street to a connection with the Fourteenth Street Pumping Station. By a main feeder connecting with the main in Fourteenth Street and running northwardly in the east side of Wabash Avenue to South Water Street, or by projecting the Michigan Avenue main feeder to South Water Street; thence in South Water Street to a connection with the 36-inch main in LaSalle Street the belt feeder would be complete, with suitable connections with the feeders from all pumping stations which are now supplying the circulative system within the proposed subway district.

ARRANGEMENT OF GAS PIPES.

The general arrangement of the gas circulating system within the subway district would be similar to that described for the water circulating system, i. e., it is proposed to install a belt line of main supply pipes feeding into the circulating system and connected with it in such manner as to provide complete circulation and equalization of pressure. Separate systems of equal capacity to present systems would be provided for illuminating and fuel gas.

DISPOSITION OF ELECTRIC WIRES AND CABLES.

For the disposition of the electric wires and cables for electric lighting, power, telegraph, telephone and other public utilities of like character occupying conduits beneath the surface of the streets, it is proposed to supply roomy, dry and well-ventilated galleries running parallel with and adjacent to the transportation subways, as shown on Plates 1, 2, 3 and 8.

The galleries designed to carry the feeder mains would have their floors located at practically the same level as the railway tracks within the subway. These galleries would be approximately 9½ feet wide and 11 feet high in the clear, with an arched roof, which would also form the floor of a gallery immediately beneath the surface of the street, and designed to contain the high level sewer and pneumatic tubes. The galleries for the electrical feeder mains would be continuous between the subway stations and would occupy the space between the wall of the subway and the curb wall situated at the outer edge of the sidewalk space. The electrical wires and cables would pass by the station points in tile conduits situated beneath the station platforms. These tile conduits would terminate in large manholes located outside the subway walls at each end of a station platform. Out of the manholes the feeder mains would be carried to the racks provided for them in the galleries above mentioned. The manholes would be of sufficient size to permit of making all necessary transposition of the wires and cables of the various circuits, and to make necessary connections with the service mains which it is proposed to locate within a separate gallery at a higher level and convenient for the distribution system

On account of the precautions which would be taken to exclude moisture, it is not expected that these wire galleries would ever contain much water; however, it is proposed to incline the floors of the galleries toward the manholes into which the tile conduits would terminate, and to connect these manholes with the low level sewers with outlets of sufficient capacity to meet any emergency, including possible leakage from water pipes located in the water pipe gallery at a higher level than the level of the wire and cable gallery. Adequate ventilation of the wire and cable gallery would be provided by the introduction of ventilating flues into the curb walls. These ventilating flues would terminate at the sidewalk level and would be covered with iron bar grates.

It is proposed to carry the service mains in each block in a gallery which would occupy the first five feet of the space inside of the curb wall; the floor of this gallery would be at or near the level of the basement floor of the buildings and its roof would be formed by the concrete sidewalk.

In the space between the service main gallery and the building line of the street would be located the gallery for water pipes, and the space filled with sand, which would be devoted to gas mains. A concrete wall would separate these latter utilities from the upper wire gallery. Through the walls of the electrical service main gallery at intervals of about 20 feet would be provided service ducts, through which service wires could be drawn into the buildings on either side of the street, as the ducts through the curb walls would extend entirely across the street above the subway roof.

Cost Estimate No. 2, Page 233, is an estimate of the cost to produce the system of subways herein outlined, known as Subway Plan No. 1, including the cost of the re-arrangement of all underground utilities and the reconstruction of all sidewalks disturbed and the relaying with asphalt of all street pavements on streets where the open cut method of construction is resorted to. In this estimate is embodied the cost of lowering and reconstructing the three existing tunnels and the construction of two new tunnels leading to the North Division.

SUBWAY PLAN NO. 2.

The subway system above described has been carefully designed, and it is believed that it will best fulfill the conditions necessary for the successful operation of a combined surface and subway railway system which is practicable without interfering with existing low level improvements.

Its chief advantage, from an operating standpoint, is that it keeps all through traffic, both north and south, and west to south, and west to north, off the surface of the streets, and will permit rapid running time for such traffic to be made through the business district of the city.

Plan No. 1 as outlined does not meet all the conditions for a complete and satisfactory solution of the transportation problem, even if used in connection with any system of surface terminals that can be devised, for the following reasons:

First—If used in connection with Surface System No. 1, as shown on Map 10, which is the best loop system I have been able to devise to most effectually utilize the business district for terminals without using grade crossings, all north and south cars would be compelled to use the subways, and almost all of the West Side cars would be brought into the business district on the surface.

From the viewpoint of those who consider that part of the traffic from all parts of the city should be conducted on the surface of the streets this plan would not be a satisfactory solution of the problem, but it is submitted as one plan complying with the conditions of my commission "to eliminate grade crossings."

Second—While some of the objections just cited would be removed by using this subway system in combination with either of the surface plans shown on Maps 2 or 3, the use of such a combined system would still compel all passengers arriving on the West Side subway cars to transfer to surface cars if they desired to ride farther east than Clark Street.

This objection could be, in a degree, overcome by moving the entire system of subways east one block, thus locating the subway shown under Wabash Avenue, under Michigan Avenue, and permitting the West Side subway loops to come as far east as Dearborn Street.

Third—The use of the system in combination with any surface system permits and creates the best possible condition for the improper use of transfers in the business district by compelling all passengers desiring to go west from the north and south subways to transfer to surface cars, unless they chance to be passing through the Clark Street subway.

In order to overcome the above objections, and submit for your consideration a complete and ideal solution of the transportation problem, and to absolutely solve the question submitted to me by you, and stated on Page 133, Subway Plan No. 2 has been devised, which is shown on Map No. 5.

All of the advantages of through routes, in all directions, of Plan No. 1 are retained, its objections are fully overcome, and its use makes it possible for the city to demand from the railway companies a universal transfer system without injustice to them. It, however, is submitted as an ideal solution of the situation with the full understanding of the difficulties which will be encountered in its construction, and in full recognition of the fact that the cost of a subway system built under this plan will be somewhat in excess of that required by the previous plan, and that more difficulties will be found than would be encountered in the adoption of Plan No. 1.

This plan retains the same north and south trunk line system of tunnels as shown in Plan No. 1, except that the line on Wabash Avenue is moved over to Michigan Avenue, and run underneath the edge of Lake Front Park, thus enabling this line to be entered at the south by the present Indiana Avenue line, provided a suitable extension of the Indiana Avenue line from Eighteenth Street north is made to connect with the subway, as shown on Map No. 5.

It will be noticed that the subway under Michigan Avenue would pass under the river at Cass Street, which arrangement could also be adopted for Plan No. 1 if it should ultimately be found advisable.

This arrangement would eliminate the difficulties which would be encountered by passing under the bridge on Dearborn Street.

If for any reason it were found desirable this line could be placed under Wabash Avenue instead of Michigan Avenue, as in Plan No. 1.

In order to get the West Side lines through to Michigan Avenue and ultimately farther east under the Lake Front Park should future extension of the park make this desirable, or if it should be thought best to connect the various passenger and freight depots of the steam railroads, a series of low level loops could be provided. These loops would extend eastward from the river at as high a level as practicable to keep underneath the north and south subways, and where they intersected the streets occupied by north and south subways double-decked stations could be provided, as shown in Plate 9. In this station, as designed, all of the business would be done on the first floor below the street surface, and the lower section of the station would consist only of platforms from which passengers would board the trains. From the lower level platform to the platform of the upper subway would be provided stairs at one end, and, if found advisable, elevators or escalators at the other end, thus making the ascent easy for those who desired to use them.

By the construction of the three or more north and south subways and the three or more low level east and west loops the entire street car traffic of the business center of Chicago could be kept below the surface for some years to come, except the traffic which would be handled by the surface distributing loop extending between the depots, thus eliminating the necessity of constructing a large part of the underground conduit electric construction at the present time, and if some independent unit system of operation should be adopted for this surface distributing system, the necessity of underground conduit construction in Chicago would be entirely eliminated until such time as it became necessary to put additional surface tracks on the streets.

It will thus be seen that the business center of the city would, if this plan were adopted, be underlaid with a series of subway tracks intersecting each other at right angles, and at a sufficient number of points to enable passengers to travel from almost any point in the business district to almost any other point with the least inconvenience, and at the same time make it impossible for passengers to improperly use transfers, for the reason that in order to get on a car the passenger must pay cash fare and pass through a subway entrance, and when transferring from any high level subway car to any other high level subway car; or from any high level subway car to any low level subway car, he cannot come to the surface to dispose of his transfer, and must of necessity take some car and use his transfer himself, for if he comes to the surface it is of no value, for the reason that no one can enter the subway on a transfer. It might be argued that this does not prohibit the misuse of transfers for the reason that some one could meet the passenger in the subway and receive and use his transfer, but this person cannot enter the subway without having paid a cash fare, consequently this argument would not prevail.

In time, after the capacity of all possible subway terminals had been reached, it would become necessary to construct surface tracks in accordance with Plans 2 or 3, shown on Maps 2 and 3, or some other plan, which would involve the delivering of a large number of pasengers in the down-town district from the surface lines. These passengers should not be permitted to transfer from one surface line to another, or from a surface line to the subway within the subway district, for the reason that if they desire to pass through from one part of the city to another they should be required to take a subway car, or if they chanced to be upon a car which did not pass through the subway they should transfer to subway cars at points outside the subway district, thus eliminating to the greatest degree the possibility of the improper use of transfers.

OBJECTIONS TO SUBWAY PLAN NUMBER 2.

It is believed that the merits of this system have been fully set forth, and the objections to it should also be recognized in the consideration of the transportation problem. The chief objections that can be made to it are:

First—Its relative cost as compared with Plan No. 1.

Second—The passengers in the low level subways would be about 40 feet below the surface of the street, thus necessitating the use of elevators between low level and high level subways at station points, a distance of about 20 feet.

Third—The engineering difficulties and risks that would be encountered in its construction.

Fourth—The fact that it would interfere, and to a large extent destroy, existing and contemplated low level improvements

The importance of the first objection can be analyzed by comparing the estimated cost of this plan, as shown in Cost Estimate No. 3, Page 236, with the cost of Plan No. 1, as shown in Cost Estimate No. 2, Page 233.

The second objection can only be answered by the individual opinion of those who might ride upon the system. In my judgment it is not serious.

The third objection, or the engineering difficulties and business risks to be assumed during the construction of such a low level street car subway, is difficult, and would require the exercising of great skill and care during construction, but can be overcome and is in my judgment comparatively small when compared with the advantages to be gained by the adoption of such a system.

The fourth objection is, in my judgment, difficult to overcome, as the changes that would necessarily have to be made in the existing and contemplated low level improvements of the Illinois Telephone and Telegraph Company to make room for the low level subway herein contemplated would probably involve heavy expenditure of money, and the relative importance of the advantages to be gained by the high and low level system of street car subways as compared with the advantages to be gained by the business interests of Chicago from the installation and operation of the existing and contemplated low level improvements of the Illinois Telephone and Telegraph Company, the ultimate function of which, in addition to the use for telephone and telegraph purposes, I understand to be the carrying and delivering of freight and packages from all railway terminals to all business houses in the city, should be well considered by your Committee and by all those whose duty it may be to ultimately decide this question. If some amicable arrangement could be made between the interests which may construct the proposed high and low level street car subway system, provided it is decided to construct it, and the interests controlling the Illinois Telephone and Telegraph Company, whereby the tunnels of the latter company could be utilized as the low level subways for the street car system, it would be one way of solving this difficulty, or if an arrangement could be made whereby the low level street car subways and the tunnels of the Illinois Telephone and Telegraph Company could be constructed jointly, and at the same time, it would to a large extent, relieve the difficulties to be encountered.

Cost Estimate 3, Page 236, is an estimate of the cost to produce Subway Plan No. 2, as above described, including all costs of every character entering into its construction, as described for Subway Plan No. 1, Pages 133 to 148.

WORKING CONDUCTOR IN SUBWAYS.

In whatever subway system is adopted, due consideration should be given to making the electrical operation of cars through it as safe as possible, which has been partially taken care of by a previous recommendation to the effect that the cars which pass through the subways should be built of non-combustible material.

There is one other source of danger in the use of electrically operated cars in tunnels, viz., the liability of injury to passengers from the electric current in case of accident, which would precipitate passengers upon the working conductor, or short-circuit the working conductors by means of the metallic or other parts of the wreckage. To provide for this, so far as practicable, the working conductor, either overhead or underneath, should be divided into sections, each section provided with suitable circuit breakers which will automatically open in case of a short circuit on any particular section, and which can be manually controlled by tower men, located at suitable points, or by the station employees. This method involves no radical improvement in existing electrical apparatus, for the parts necessary are standardized today, but attention should be given to this subject at the time of the construction of the subway.

It will be noticed that the Plates illustrating the subways show an overhead working conductor, or trolley wire, and also conductors located underneath the cars between the rails of each track.

Owing to the fact that Chicago covers so great an area, and the improbability of its entire area becoming so densely populated for some years to come as to require underground conduit construction throughout, it seems best to so construct the subways that cars equipped with overhead trolleys and operating in the sparsely settled districts of the outlying territory and not equipped with the conduit plow or shoe (the part which carries the current from the working conductor to the motors through the slot of an underground system) could be allowed to run through the subways for the purpose of the accomplishment of the proper routing of the cars. At the same time it will be necessary to run through the subways some cars which in time will operate over underground conduit tracks outside the subway district, and for this reason the subway has been supplied with conductors between the rails of each track; these conductors to be of the same general design as those used in the underground conduit construction, but placed above the ties, it being a comparatively easy matter to make a suitable arrangement for allowing the plow of the car to pass out of the covered conduit construction to the open surface working conductor as shown in the subways, for the reason that this opening could be made on the incline where the cars enter the subway, and thus not interfere with team traffic.

By providing the subway with both overhead and surface contact construction all cars of the operating company could be made completely interchangeable so far as operating through the subway is concerned, and operated through the subway or over the surface of the streets, or in the outlying districts, at the will of the management.

SUMMARY OF RECOMMENDATIONS

Summarized, then, my recommendations on the subway and surface terminal problem are as follows, and are given in the order of their merit from an engineering and transportation standpoint:

First.—Subway plan No. 2 in connection with
  (a) Surface Plan No. 3; or,
  (b) Surface Plan No. 2; or,
  (c) Surface Plan No. 1, with suitable connections for accommodating through cars.

Second.—In case it is found for business reasons impracticable to construct Subway Plan No. 2, I recommend
  Subway Plan No. 1 in connection with
  (a) Surface Plan No. 3; or,
  (b) Surface Plan No. 2; or,
  (c) Surface Plan No. 1, with suitable connections for accommodating through cars.

Third.—If for any reason it is found inadvisable to at present construct the entire subway system as outlined in Subway Plan No. 2, or Subway Plan No. 1, one north and south subway, and one low level east and west loop could be constructed at present, which, if used in connection with any one of the surface plans, would largely relieve the present congestion, and leave the future subways to be constructed when needed, it being understood that whatever subway work is done should be done in such a manner that it follows one or the other of the general plans recommended.

Considering the surface terminal problem by itself, I recommend the adoption of Plan No. 3, as described on Page 42, Part II, and the immediate lowering of the tops of the tunnels to such an extent that marine traffic will no longer be impaired, and the preserving of portions of the tunnels for use in connection with future subways.

PART VI.—CHAPTER II.

UNDERGROUND ELECTRIC CONDUIT SYSTEM.

Your Honorable Committee has requested me "to report on the feasibility and desirability of an Underground Conduit System of railway in the down-town district of Chicago, and on all trunk lines within prescribed limits, with proper arrangements for transferring from underground to overhead trolley and vice versa without disarrangement of the required headway of cars on either trunk or branch lines." The statement has already been made in Part II that underground conduit construction in Chicago is feasible, and should ultimately be required on all well-paved streets in densely populated districts.

Thorough drainage of the conduits is of utmost importance to the successful operation of the underground conduit type of electrical railways. This necessary drainage can be most readily accomplished in situations where the sewers are constructed at a sufficient inclination to speedily carry away the storm water, or where the railway is located along the summit of a ridge with the country on both sides of the railway line sloping away from it. The latter condition is well illustrated by the Broadway line in the City of New York. The subject of inadequate drainage in Chicago has been the one most frequently brought forward and vigorously urged as the reason why underground electric railways are not feasible in Chicago, and the flooding of the cable railway conduits during storms has been held up as positive proof that it is impracticable to install and operate underground conduit electrical railways in Chicago without frequent interruptions to traffic on account of the flooding and freezing in conduits, unless the entire drainage system of the city were remodeled in some way to insure the speedy removal of all storm water. The flooding of the existing cable railway conduits during storms is not entirely due to the inadequacy of the city drainage system; on the contrary, it is largely attributable to the insufficiency and improper construction of the cable railway drainage system which connects with the city system of drainage. The connections between the cable railway drainage pipes and the city sewer system are infrequent, and those that have been provided are seldom clear and in working order. Even with all the openings to the sewers in proper working condition the capacities of the railway drains are not sufficient to enable them to carry away promptly the volume of storm water which enters the cable conduits.

The gradient of the cable conduits are parallel with the street gradients, which for long distances in some of the Chicago streets are practically horizontal, and if the openings from the cable conduit to the sewers are not frequent enough, or are allowed to become filled with dirt, the water cannot leave the cable conduit and the tube is soon filled and overflows through the slot at the surface of the street. It is entirely practicable to build underground conduits for railway purposes in the streets of Chicago, especially within the business district, and provide a drainage system connecting with the city sewers which will keep the electrical conduits sufficiently free of water at all times to prevent any serious interference with the operation of the railway.

Under Chicago conditions the installation of underground conduit electrical railway would naturally be confined to limited districts, and to avoid the necessity of having two distinct sets of rolling stock, it would be necessary to devise a mechanism on the cars and within the track conduit which would permit any car to operate on either underground conduit or overhead trolley lines. Such a system of operation is entirely practicable. Mechanism can be applied which will permit of the change being made, at designated points, from underground conduit to overhead trolley contact and vice versa with practically no delay to the car.

The drawings on Plates Nos. 10 and 11, submitted herewith, are typical illustrations of a system of underground conduit electrical railway which, in my judgment, will be applicable to Chicago conditions. An estimate of the cost to produce one mile of single track electrical conduit railway, if built substantially in accordance with the typical designs submitted herewith, is given in Unit Price Estimate J, Page 194. This estimate is made to cover the construction of an underground conduit line in streets not previously occupied by railway tracks. If this type of construction were placed in streets which are now occupied by cable railways the cost per mile of track would be reduced by the amount of salvage which could be derived from the sale of old cable material taken out of the street. This sum would be variable and would probably, under favorable conditions, not exceed $3,000 per mile of single track.

TRANSFORMATION OF CABLE LINES INTO ELECTRIC LINES.

I am requested to "report on the cost of transforming the present cable lines into an underground electric system."

This question has been mentioned in Part II. of this report, wherein the statement is made that the yokes which were used in the construction of the Cable railways in Chicago were not designed to carry heavy rolling stock such as is now in daily operation on the electric railway lines in this city, and the Milwaukee Avenue line is cited as an instance which verifies the correctness of the statement.

The conditions which obtain in respect to the Milwaukee Avenue Cable line may be said to apply to a large proportion of the cable railway tracks in Chicago, and where they do apply, it is impracticable to convert the cable lines into underground electric railway and produce a satisfactory and durable construction. There are, however, some portions of the cable system which could be converted for the electrical propulsion of cars, especially within the district where overhead trolley construction would be permissible, but it is doubtful if it would prove economical to attempt to convert any of the existing cable track into underground electric conduit railway. The construction of a durable track to carry the heavy rolling stock of modern electrical railways involves the use of rails having sufficient depth and section to resist bending under the loads put upon them. The depth of the rail in first-class construction is also regulated in some degree by the character of the pavement and its foundations. The rail which seems to be most suitable to meet all requirements has a depth of nine inches. The yokes used in the construction of nearly all of the cable tracks in Chicago were designed for shallower rails. The track rails supported by these yokes range from seven inches to four inches in depth. The manholes in cable railway tracks are located about thirty feet apart at points where pulley wheel supports occur. The insulated supports for the contact bars in an underground electric conduit railway are usually spaced not more than fifteen feet apart and a manhole is required at each of these insulated supports.

The drainage of electrical conduits must be practically perfect; if it is not, serious interruptions to traffic are certain to ensue. The drainage system of the cable railways in Chicago, as constructed, is utterly inadequate for the purposes of electrical operation, and any attempt to convert the cable lines into underground electric conduit railway involves the redesigning and entire reconstruction of the cable drainage system.

From the foregoing statements it will be seen that with the re-modeling of the yokes to receive deeper rails, doubling the number of manholes, reconstructing the drainage system, and attempting to fit new work to old, the conversion of the existing cable lines into an underground electric system will probably involve an expenditure of money equal to the amount required to create an entirely new system of underground electric conduit, and the property created would not be as durable as new construction throughout.

Under conditions as above set forth, it seems that little saving would be made in attempting to transform the existing cable conduit into electric conduit. My estimate (See Unit Price Estimate J, Page 194) of the cost of constructing new underground electric conduit railway will apply to the cost of converting the existing cable lines into underground electric systems.

PART VI.—CHAPTER III.

ELECTROLYSIS.

The destructive effect of the electric current on water pipes and other underground improvements in districts where the overhead trolley and ground return system of electric railway has been installed has been quite marked in places, but with the improved methods of bonding in vogue at the present time the difficulties have been largely overcome, so that the general question is not so serious as it was ten years ago.

In Chicago a careful test for electrolysis has been made under the direction of the City Electrician over almost the entire city, and while disturbances were found means of prevention have been formulated by the Electrical Department and embodied in an ordinance known as the "Electrolysis Ordinance," passed July 16, 1900, which, in recent construction and reconstruction, have been put into effect by the various companies operating in the city, resulting in the elimination of the difficulty in a large degree.

The ordinance reads in part as follows: "Every person, firm or corporation operating, owning, or controlling any surface or elevated railroad or any street railway within the city of Chicago, upon which cars are now or hereafter operated by electricity as a motive power, with a grounded return circuit for conveying the electricity, shall install and maintain a metallic return circuit of such cross section and conductivity for conveying the electricity so used as a motive power that the maximum difference of potential will not at any time exceed one (1) volt between any part of such metallic return circuit and any water pipes, gas pipes, or other metals not installed for the purpose of forming a part of such metallic return circuit, and that there will not be a variation in difference of potential exceeding one-half (½) volt between any two measurements made at the same time at points along and upon said metallic return circuit within a distance of three hundred (300) feet or less from each other. Such metallic return circuit shall be installed and maintained in accordance with the provisions of the general ordinances of the City of Chicago, now or hereafter in force.''

The best electric railway practice at the present time involves the bonding or joining together of the ends of the rails with a copper or other bond which has an electric conductivity equal, or approximately equal, to the conductivity of the rail. With this accomplished the return current follows the rails of the track, and has but little tendency to leave its regular path and pass into the earth or to water pipes or other underground improvements, provided the conductivity of the rail is sufficient. If the conductivity of the rail is not sufficient, through lack of sectional area or conductivity of material, it should be supplemented by an additonal metallic return circuit securely bonded to both rails of the track at distances about 100 feet apart, in districts where the quantity of current liable to flow is large, which is often the case in the business district where cars become bunched. In outlying districts these connections need not be so close.

In Chicago, and elsewhere, one of the most effective ways to insure a perfect bond between the ends of the rails, and at the same time secure a rigid and permanent joint, has been to electrically weld or cast-weld the ends of the rails together. The greatest conductivity is secured when the rails are welded, as the cross section at the joint is then made equal to or considerably greater than the cross section of the rail itself, and as this is the method which has been adopted almost exclusively in Chicago, it will be seen that where track has been laid in recent years the difficulties from electrolysis are overcome to as great an extent as modern practice demands. There are, however, many pieces of track which are not as well bonded as they might be, and it is from such sources that damage from electrolysis naturally ensues.

As the overhead trolley construction, and consequently the grounded rail circuit, is eliminated from the city by the introduction of the electric conduit the electrolysis, due from the street railways, will disappear, for the reason that the conduit construction is built with a complete metallic circuit and without any ground connection, thus removing entirely the conditions so far as street railways are concerned, which make electrolysis possible.

PART VI.—CHAPTER IV.

UNION ELEVATED LOOP.

The Union Elevated Loop, which encircles the business district of Chicago, is a two-tracked railroad, two miles in length, and it serves as a terminal for the traffic coming from practically seven different elevated railroad lines. The Metropolitan West Side Elevated brings in over the four-track structure East of Marshfield Avenue the traffic from its four double-track branches. The traffic from the South Side Elevated road, as well as that from the Lake Street and the Northwestern Elevated lines, is operated over this two-tracked structure simultaneously with the traffic coming from the Metropolitan lines. No less than 1,600 trains ranging from two to five cars in length are delivered to the loop railroad daily. The total number of cars operated on this loop per day is 5,000. The traffic of the Elevated railroads, like that of the surface lines which terminate in the business district, is principally handled during ninety minutes in the morning and ninety minutes in the evening. The period of maximum congestion on the loop tracks extends over approximately 30 minutes during the morning and 30 minutes during the evening rush hour. At these times the average headway between trains on the outer loop is 19.8 seconds and on the inner loop it is 19.5 seconds. *The ultimate capacity of the loop tracks is fixed by the number of in-bound and out-bound trains which it is possible to pass through the junctions at Lake Street and Fifth Avenue, Wabash Avenue and Van Buren Street, and Van Buren Street and Fifth Avenue.* It has been demonstrated that a train of five cars can be successfully and successively passed through one of the junctions from a state of rest to clearance, and the interlocking combinations be operated to open another route for the passage of incoming or out-going trains, in 45 seconds of time. If it were necessary to operate the interlocking mechanism for each in-bound and out-bound train, the capacity of these junctions would long ago have been exceeded. It is possible, and in fact, is the usual practice to simultaneously pass an in-bound and an out-bound train from the main line to the loop and vice versa.

CAPACITY NOW LIMITED BY STATION PLATFORMS.

As previously stated, the ultimate capacity of the present double-tracked loop is limited to the maximum number of trains which it is possible to pass in all directions through the junction points, and moreover, the capacity of the junctions cannot be increased. Under existing conditions, however, it is *the station platforms* on the loop and *not the junctions* which limit the number of trains that can be operated over its tracks.

These platforms are much too short to admit of trains being operated at intervals and speeds which will equal the capacity of the junctions. They should be lengthened sufficiently to permit two trains, of five or six cars each, to simultaneously occupy a platform. If the junctions were operated to their maximum capacity, the longest time to be consumed by a train in making one complete circuit of the loop should not exceed fifteen minutes. Under the existing conditions, during the hours of maximum traffic, the average time consumed by a train in making a complete circuit of the loop is twenty minutes. To any one who will take the trouble to observe the movement of trains on these tracks any day between the hours of 5:30 p. m. and 7 p. m. the reason for this loss of time in making a round trip of the loop will become apparent. He will find that the headway, or spacing, of the trains on both tracks cannot be materially reduced; in other words, he will find crowded on these tracks at that time the maximum number of trains consistent with safe operation. He will also discover that the movement of every train is very much retarded at each station because it is prevented from approaching the platform until the preceding train has taken on its load of passengers and is under way leaving the station. There are eleven stations on the loop at which all trains stop, and, under the conditions above described, it is obvious that each train must be retarded and accelerated twenty-two times, instead of eleven times, as would be the case if the train could approach the station platforms without having to wait for the train preceding it to move out of the way. It is the frequent starting and stopping of the trains which regulates the time schedules in the operation of the elevated railroads. The average distance between the loop stations is less than 955 feet and it is evident that under the most favorable conditions, most of the time consumed in making a circuit of the loop is taken up in accelerating and retarding the trains, and when these operations are multiplied by two the efficiency of the loop as a terminal is very materially reduced. The actual loss in efficiency is very closely represented by the difference in time required for a train to complete a round trip. As shown by the foregoing statements, this difference in time is approximately 25 per cent.

In respect to the ability of the junction mechanism to handle additional traffic, observation indicates that it has ample capacity to care for any increased efficiency of the loop which may be created by the extension of station platforms.

OTHER SUGGESTIONS FOR INCREASING LOOP CAPACITY.

The extension of these platforms sufficiently to provide for the accommodation of two full trains at the same instant, *is the only method by which the capacity of the present two-track loop structure can be increased.* The enlargement of the loop by extending it South on Fifth Avenue to Polk Street, thence East on Polk Street to Wabash Avenue, thence North on Wabash Avenue to a connection with the present structure at Harrison Street has been suggested as a possible means of providing additional capacity.

From the transportation point of view, this proposition is entirely without merit. If the loop were enlarged as suggested, and the railroad companies could be induced to operate their trains over it, its sole effect upon the transportation situation would be to practically double the loop mileage, and the time required to make a circuit of the loop. To maintain the same frequency of service as that given at the present time the number of trains on the loop at all times would be increased in direct ratio with the increased length of the loop.

The gross revenue to the railroad company would not be increased except by the small amount of local business which might be taken away from the surface lines in the territory lying between Polk and Lake Streets and east of the river. The fixed charges and operating expenses of all companies using the loop tracks would be materially increased, while the service furnished to the traveling public would not be improved in any degree.

Of course, by extending the Loop to Polk Street a larger area would be directly served by elevated road transportation, but it would be done at the cost of time and convenience to the present patrons of the elevated system, compelling, as it would, a large proportion of them to spend twice as much time on the loop as they do at present. The time consumed in rounding the present loop is a serious objection to all patrons of the several lines who are located adjacent to the side of the loop first traversed by their line upon entering the loop, as they are all compelled to make the entire circuit of the loop before getting started toward their destination.

If the present structure in Van Buren Street were allowed to remain and an extension were made to and in Polk Street, and a portion of the trains of each line were operated around the large loop and a portion around the small loops, thus created, the capacity of the terminal facilities *would not be increased,* as it has been shown that the capacity of the loop cannot exceed the capacity of the present junction points where the trains enter and leave the loop.

If it were possible to put four tracks on the Van Buren Street structure, which cannot be done without the abandonment of the stations, Van Buren Street being only 66 feet in width, the use of the junction points would not be decreased; therefore the four tracks would not help matters. It it therefore evident this plan of extending the loop and operating trains does not increase the capacity of the loop.

From both the construction and operating points of view, it is entirely practicable to double the capacity of the Elevated Loop terminals, by providing a separate loop for each of the four operating companies, and to wholly eliminate the crossings and junctions which are at present the limiting factors in determining the efficiency of the loop as a terminal. A re-arrangement of the loop tracks which will furnish a complete solution of the problem, as above stated, is shown by Map No. 13.

By the construction of a two-track structure in Clark street from Van Buren Street to Lake Street, and a two-track structure in Monroe Street from Wabash Avenue to Fifth Avenue, the present large double-track loop would be divided into four smaller single-track loops to be operated as follows:

The trains of the Metropolitan West Side Elevated Road would run East in Van Buren Street to Clark Street, North in Clark Street to Monroe Street, West in Monroe Street to Fifth Avenue, South in Fifth Avenue to Van Buren, thence Westwardly on the main line.

The trains of the South Side Elevated Road would run North in Wabash Avenue to Monroe Street, West in Monroe Street to Clark Street, South in Clark Street to Van Buren Street, East in Van Buren Street to Wabash Avenue, thence Southwardly on the main line.

The Northwestern Elevated Railroad trains would enter the loop at Fifth Avenue and Lake Street, running East in Lake Street to Wabash Avenue, South in Wabash Avenue to Monroe Street, West in Monroe Street to Clark Street, North in Clark Street to Lake Street, West in Lake Street to Fifth Avenue, thence Northwardly on the main line.

The Lake Street Elevated Railroad trains would enter the loop at Fifth Avenue and Lake Street, running East in Lake Street to Clark Street, South in Clark Street to Monroe Street, West in Monroe Street to Fifth Avenue, North in Fifth Avenue to Lake Street, thence Westwardly on the main line.

On account of the Lake Street and the Northwestern Elevated lines both entering and leaving the loop at the same street intersection, it would be necessary to construct a third track on the elevated structure in Lake Street from Clark Street to Fifth Avenue, if all grade crossings and junctions were to be eliminated. The construction of this third track would be entirely practicable without placing additional burden on the street; in fact, if these crossings and junctions could be abandoned the most objectionable feature of the loop, from the standpoint of the public, would be removed. Facilities for transferring from one elevated railroad line to another would be maintained by the creation of a station, at the intersection of Monroe and Clark Streets, which would be common to the four loops, each road having its separate platform, but all the platforms being connected by means of a sub-platform suspended beneath the tracks in the same manner as the sub-platforms to the present loop stations are suspended.

In addition to the transfer feature, by properly connecting the various loop tracks with each other, provision could be made for through elevated traffic between the various divisions of the city. By this arrangement of loop tracks in the business district the elasticity of the elevated railroad system would not be curtailed in any way, except that all of the trains of all the railways would not be able to make a complete circuit of the large loop. Over and against this abridgement of the circuit covered by all of the trains as now operated, is the ability to bring into a central point in the business district as many trains as it is possible to operate on the main lines of all the various railways, thereby creating terminal facilities which would adequately serve the public and take care of the normal increase in elevated railroad traffic for many years to come.

The same results in increasing capacity could be obtained by the creation of four separate and distinct loops, using the present Van Buren Street structure for the middle crossing of the loop and extending the structure South on Fifth Avenue and East in Polk Street to Wabash Avenue, thence North in Wabash Avenue to the present structure in Wabash Avenue at Harrison Street, and building a double-track structure through Clark Street from Lake Street to Polk Street, as shown on Map No. 14.

By this arrangement the converging point of the four loops would be Van Buren and Clark Streets instead of Monroe and Clark Streets. The trains of the Lake Street and Northwestern lines would, under this arrangement, be brought as far south as Van Buren Street, but the South Side Elevated line and the lines of the Metropolitan Elevated would not be brought North of Van Buren Street.

Unless some such plan of separate loops is adopted, the only remaining method by which additional terminal facilities can be provided for the elevated railroads after the full capacity of the present junctions has been reached through extension of platforms, is by establishing auxiliary stub terminals outside of the loop and adjacent to the business district.

Should the time ever come when all the elevated railroads were consolidated under one control and passengers were transported within the district served by all of the companies, for one fare, the problem of increasing the loop capacity would cease to be a problem, as the tracks now forming the loop, by slightly changing the present junction points, would become simply sections in through lines, that would be operated between the North, South and West Divisions. The loop could then be operated in conjunction with these through lines, as at present, to furnish terminal facilities for any auxiliary service that might be required during the morning and evening rush hours.

SUMMARY AND RECOMMENDATIONS.

Summarized, then, the possible improvements to accommodate increased traffic on the Union Loop are as follows:

First—The extension of the present platforms.

Second—The provision of stub end terminals for each independent company.

Third—That if further loop capacity is demanded after the above recommendations have been put into execution, it could be secured by the extension of the Union Loop South on Fifth Avenue to Polk Street, thence East on Polk Street to Wabash Avenue, and North on Wabash Avenue to a connection with the present structure at Harrison Street, and dividing it into four parts by means of a North and South line on Clark Street as described.

Fourth—The ultimate utilization of the entire Union Loop, either as it is now constructed, or as it may hereafter be extended, as a part of a through line system for the combined operation of through cars over all the elevated structures between all divisions of the city.

I recommend the *first* and *second* methods as practicable and desirable under the present diversity of ownership of the roads, and should conditions, either through the joint ownership of the roads or joint traffic agreements, ever make it possible to realize the *fourth* method, *I recommend it,* as it is the one that will tend most to relieve the congestion of the Loop and extend the greatest benefits to the patrons of the various roads.

PART VI.—CHAPTER V.

TRACK RAILS AND TRACK CONSTRUCTION.

I have been requested to submit a design for a track rail which will be practicable for the operation of cars under Chicago conditions, and which will best protect the street pavements; also to report on the desirability and cost of laying cement road-beds.

The design of track rail is of vital importance to a Street Railway Company, and with the demand for better paved streets which has arisen in Chicago in later years the design is of equal importance to the taxpayer and the municipality. Not alone are the interests of the railway companies, the taxpayers and the municipality to be considered, but every individual patronizing street cars, as well as every vehicle owner using the streets in common with the cars, is interested and affected by the decision that may be reached. As the question is of such importance to everybody, very careful consideration should be given the matter, from all standpoints, in order that no injustice may be done to any interests and that the most satisfactory standards may be adopted to best protect the interests of all parties concerned. As is the case in other matters involved in this transportation question, what is practicable and has been done in other cities has little bearing on what is practicable and can be done in Chicago, —because conditions vary to such a degree that entirely new situations exist which cannot be treated under any standard formula. It must be recognized that Chicago has had an enormous and unprecedented growth in a very short time (largely through the annexation of adjacent territory). This growth has necessitated the extension of street car lines into territory where property values will not warrant heavy assessments for an expensive street paving and the revenue to the municipality, derived from the tax levy on this cheap property, is inadequate to properly maintain the pavement that *does* exist. The same design of rail that it would be practicable to use in a well-maintained street paved with asphalt or dressed granite, would not be practicable in outlying streets cheaply paved and poorly maintained. The same is true as to a large number of streets in the older portions of the city, on which the paving has been allowed to deteriorate through lack of funds in the hands of the city to properly maintain it and through the disinclination on the part of abutting property owners to bear the expense of repaving when their property was daily depreciating through the outgo of population to the newly annexed territory.

USE OF TRAM RAILS BY VEHICLES.

The statement that such a rail as would be practicable to use in well paved and well maintained streets would not be practicable to use on these poorly paved streets, is not made from the Street Railway Company's standpoint, but from the standpoint of the citizen who uses these streets with vehicles. In the absence of well paved.and well maintained streets it would be a great hardship on the whole vehicular traffic of the city to demand the installation of a rail which would deprive vehicles of the roadway at present furnished by the girder tram rail now in use. The free movement of wheeled vehicles throughout a large proportion of the city would be materially retarded by the universal adoption of the girder grooved rail, and such change should be made only as new and permanent pavement is laid. The design of rail affects the individual who patronizes the street cars operating on poorly paved streets, through the inability of the car to operate on a grooved rail that is clogged with mud and debris from the adjacent roadways, with the same speed and smoothness as is possible on the present girder tram type of rail.

In the outlying districts,—where the time between cars is infrequent,—during the inclement weather of our winters, the grooved rail would frequently become clogged with ice that would prohibit the operation of cars until it was removed. This would not occur on streets where cars run at close enough intervals to clear the groove by the passage of the wheel flange. The girder grooved type of rail should not be installed on streets where contiguous population is insufficient to warrant a frequency of cars capable of clearing the groove.

From the standpoint of a Street Railway Company the design of rail is generally a compromise between the demands of the several department heads. the demands of team traffic, and the ordinances of the city.

The superintendent of motive power, charged with the production of sufficient power to propel the cars under any and all conditions at the least possible cost, demands that a rail be provided that will offer the least resistance to the movement of the car and also one that will be kept absolutely clean under all conditions, so that a continuous contact with the wheel of the car can be assured, both of which conditions materially affect his monthly statement. He is convinced that the only rail that should be used is the ordinary steam railroad "T" rail, laid well above the surface of the pavement with ample room left for the wheel flange.

The superintendent of transportation is satisfied with this rail until the pavement parallel with and immediately adjoining the rail becomes so badly rutted that his cars are constantly delayed by the slow progress of teams; then he demands that a place be created on the rail for the accommodation of wheeled vehicles,—that *will* insist on following the tracks,—to the end that their movement may be accelerated and thus cease to delay his cars.

The Superintendent of Maintenance of Way, charged with the maintaining of the pavement embraced within the outside rails of the tracks, demands that the rails be of the girder type, not less than 7 inches in height, so that sufficient foundation can be laid between the paving and the top of the tie, and he is equally insistent that a place be provided on the rail for wagon wheels, so that they will not wear out the pavement.

The owners of vehicles are pleased at the provision made for their accommodation and vigorously oppose any change that threatens to deprive them of their privileges, until some other pavement equally as good is provided.

The General Manager, in his endeavor to meet the requirements of all, adopted the present girder tram rail, which, up to very recently was considered ideal, and which has been specified in a number of ordinances granted to the Chicago companies.

REASON FOR THE DEMAND FOR GROOVED RAILS.

There has grown up among the drivers of teams a habit of running the wheels on one side of their wagons in the outside car track, while the other wheels run on the paving.. As the gage of the majority of vehicles is the same, and as this habit is very nearly universal, a depression is soon worn in the surface of the paving, destroying its appearance and life.

On account of this wear on the pavement, and from a desire to secure car tracks that can be crossed at any point on the street without transmitting a jolt to the vehicle, has arisen the demand for the full-grooved rail. The full-grooved rail is one where the flange of the rail is brought up flush with the head and is the ideal rail from the viewpoint of having the surface of the street present an unbroken surface; but such a rail can not be cleaned by the passage of the wheel flange. The dirt will pack down in the groove until cars run off the track. The compromise is to lower the flange on the rail and grade the incline from the bottom of the groove to the top of the flange on such an angle that the dirt can be forced up the incline and out over the edge of the flange. If the flange is lowered too much a guiding shoulder for wagon wheels is created by the head of the rail and vehicles will follow the rail as much as they do the present tram rail, but an advantage is gained in that the wheels can climb the inclined flange and leave the track easily and without wrenching the running gear. The accompanying figures show the evolution of the street car rail and the effect of the design of the rail on the paving. The figures also show the design of rail adopted in several cities suitable for the conditons obtaining.

TYPE OF RAIL RECOMMENDED.

Figure 29 illustrates the design of a rail section which has recently been adopted by the Rapid Transit Company of Philadelphia as its standard rail for use on streets as paved with asphalt, brick or dressed granite. This rail weighs 135 pounds per lineal yard and as designed presents some new and very valuable features which have not heretofore appeared in any of the designs for girder grooved rails, which have been manufactured. Its great weight and strength will be of material assistance in the production of a rigid and unyielding track. The increased breadth of tread with the slight bevel toward the back of the rail is a very important improvement for two reasons.

First—It provides for the use of car wheels with broad treads which will present a greater surface for frictional resistance to brake shoes, thus reducing the wear of brake shoes and of the wheels.

Second—The beveled surface at the back of the tread of the rail will prevent the wheel from crushing or wearing the pavement where it comes in contact with the rail head. The web of this rail is brought nearly central under the bearing point of the head, which is a desirable feature where traffic is very heavy. The load is then transmitted more directly to the base without

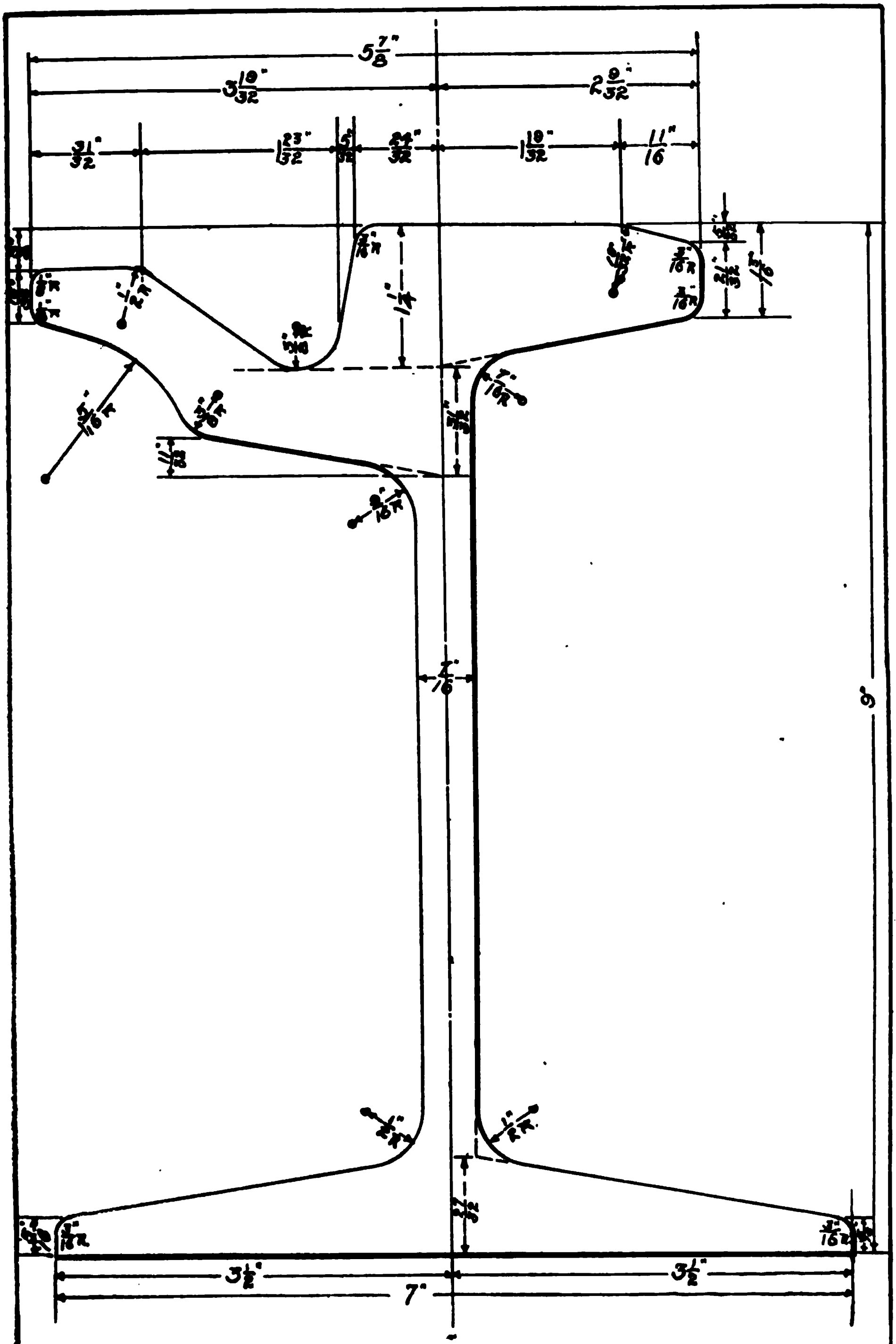
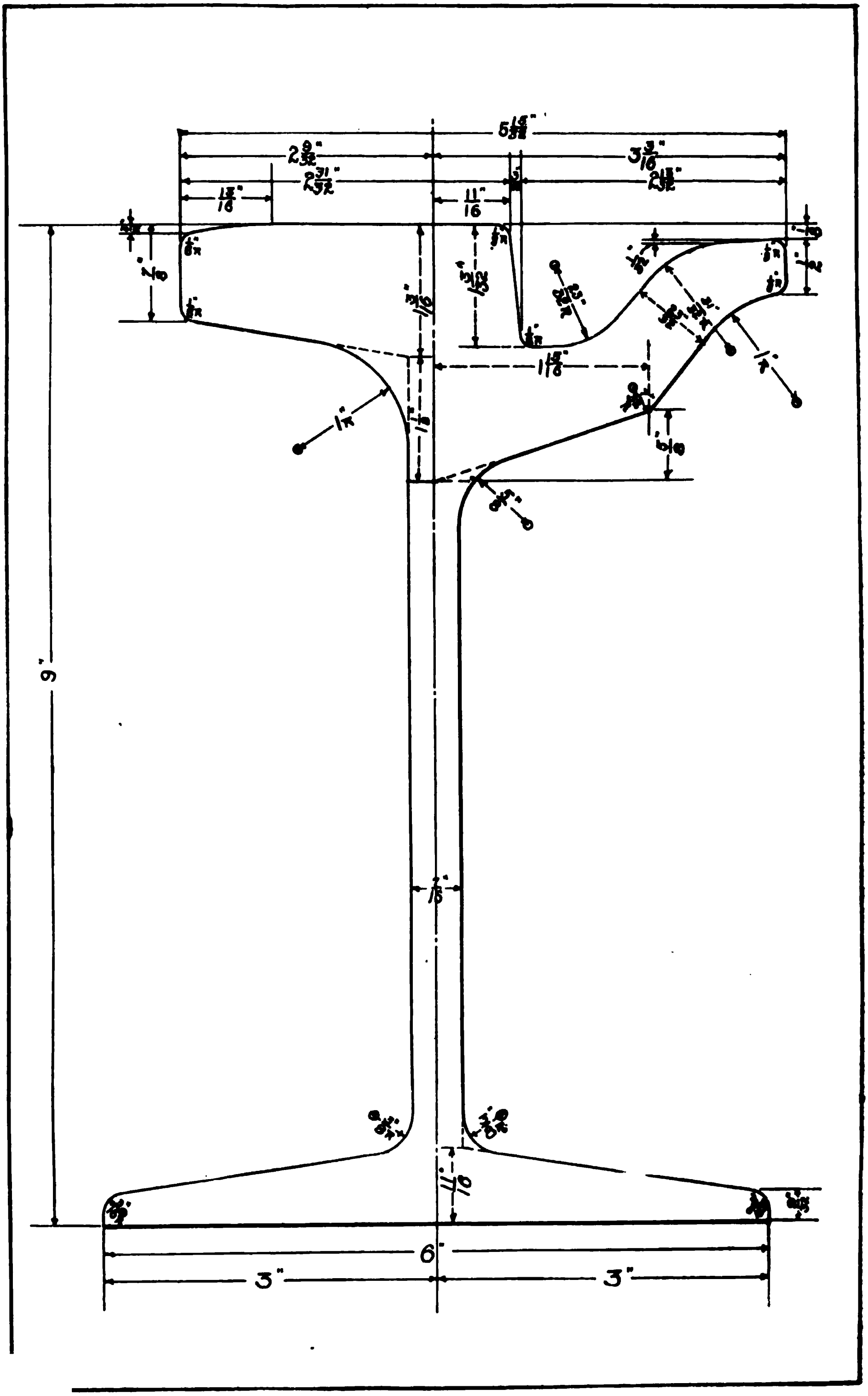

5 7/8"
3 19/32"
2 9/32"
31/32"
1 23/32"
5/32
21/32"
1 19/32"
11/16"
1 1/4"
1/2"R
5/16"R
7/16"R
7/16"
9"
1/2"R
1/2"R
3/16"R
3/16"R
3 1/2"
3 1/2"
7"

FIGURE 29.

5 15/32"
2 9/32"
3 3/16"
2 31/32"
2 15/32"
15/16"
11/16"
1 15/16"
1"R
7/16"
9"
6"
3"
3"

much tendency to cant the rail out. It also gives greater thickness of neck and consequently much more wear when used on curves.

The principal objection which may be raised against the Philadelphia rail is in respect to the projection of the head or tread of the rail above the outer edge of the groove flange, which amounts to 5-16 of an inch. Although these flanges are so designed that it will not be difficult for any kind of vehicles to leave the tracks, the projection of the head above the flange is sufficient to invite teams to follow the tracks.

In Philadelphia the Street Railway Company is charged with the entire cost of the maintenance of the paving on the entire street from curb to curb on all streets on which it has tracks, and as the tracks are principally single tracks this means some 500 miles of street. It is reasonable to suppose that where the railway company is responsible for the condition of the pavement outside of its tracks as well as within its tracks, the design of rail finally adopted would be the design calculated, in operation, to give the best results from all viewpoints. It certainly was not adopted to cheapen construction of tracks, as it is the heaviest girder grooved rail ever rolled. It must have been considered to be the best rail in reference to paving maintenance, as such maintenance is borne by the campany and is by far the greatest item of cost in connection with maintenance of way. On this basis of reasoning and from the fact that this rail is the latest rail designed, in the light of the rapidly advancing science of conducting transportation and in view of the demands of municipalities for better maintained pavement, I am prompted to submit the design of rail as shown in Figure 30, which is similar to the Philadelphia rail, to meet the requirements of Chicago conditions, for use on streets that are paved with asphalt, brick or dressed granite, when such pavement is kept cleaned and well maintained.

It will be noticed that the flange is only 5-32 of an inch below the head of the rail while the flange of the Philadelphia rail is 5-16 of an inch. This change is made to reduce the invitation to teams to follow the tracks and with the understanding that it shall only be required to be laid as new pavement of asphalt, brick or dressed granite is laid. It would not be advisable to require its installation on unpaved or poorly paved streets and on streets paved with other material than asphalt, brick or granite.

The adjustment of the pavement to the track rails is a matter concerning which opinion is divided, especially in respect to asphalt pavement. Some engineers and others skilled in such matters contend that where the track is fairly stable and rails of suitable top section are used, it is better to lay the asphalt surface directly against the rails, as shown in Figure 31, while others prefer to interpose a toothing of granite blocks between.

I am of the opinion that the interposition of a well-dressed ribbon of granite between the rails and the asphaltic surface of the pavement is the practice to be preferred, because in warm weather the steel rail absorbs more heat and retains it longer than granite. The asphaltic mastic, if placed next to the rail, is softened and permanent distortion of the surface of the pavement next to and parallel with the rail takes place.

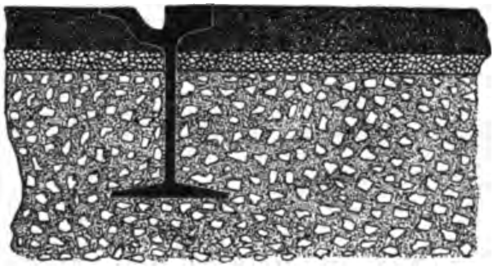


FIGURE 31

Figures 32 to 35 illustrate the various sections of flat rails which were in common use on street railways prior to the introduction of mechanical traction.

Figures 36 to 45 illustrate the later girder tram and girder groove rail sections, increasing in weight, height and form of head as the demands of heavier cars and vehicles required and as a better class of paving was desired.

Figure 46 shows very clearly the objectionable features of the center bearing rail which was for many years in extensive use in nearly all large cities. Some of it is in use today on horse car tracks in New York.

Figure 47 is a partial section of a cable railway which fairly represents the conditions where the paving blocks rest on a bed of concrete with a thin bed of sand between, giving a practically unyielding bed, and where the blocks were laid to project above the rail in accordance with the old practice where the foundation was of a more yielding nature and the pavement usually sunk

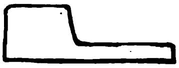


FIGURE 32.

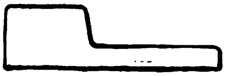


FIGURE 33.

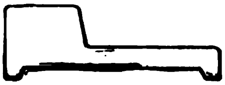


FIGURE 34.

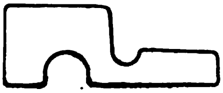


FIGURE 35.

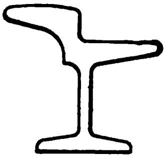


FIGURE 36.

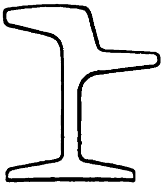


FIGURE 37.

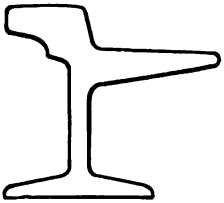


FIGURE 38.

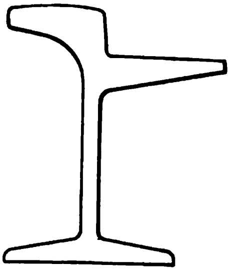


FIGURE 39.

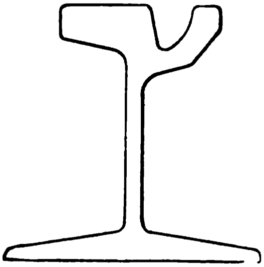


FIGURE 40.

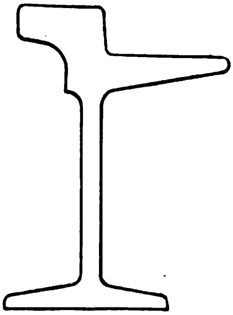


FIGURE 41.

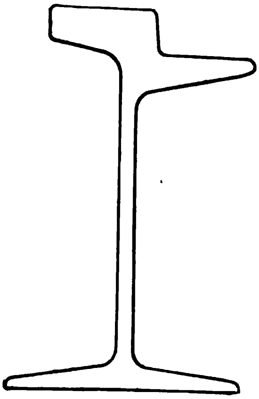


FIGURE 42.

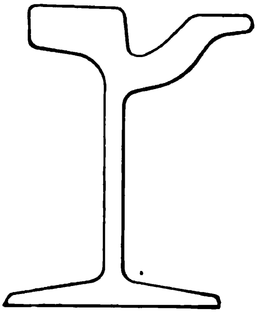


FIGURE 43.

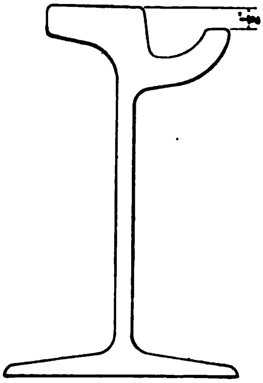


FIGURE 44.

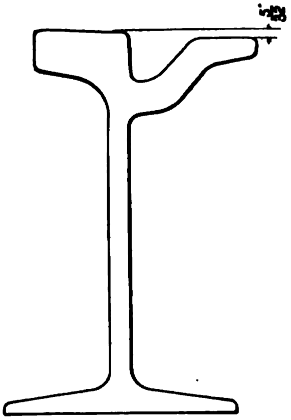


FIGURE 45.

below the head of the rail under the weight of the street traffic. As indicated in Figure 46, where the concrete base was used the pavement has remained just where it was put, with the result that there is a deep rut along each line of rails, the bottom of which is on a level with the rail head or tram.

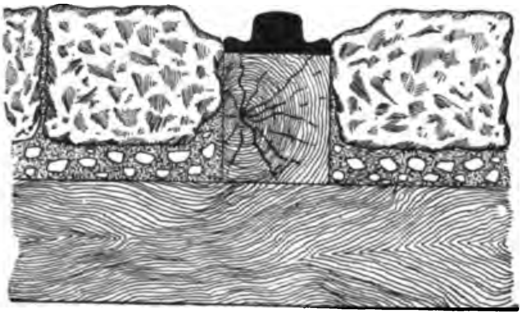


FIGURE 46.

Figure 48 shows a part of a cable track in asphalt pavement. The hollow on the inside of each track rail shows where the wear, due to vehicular traffic, has been concentrated.

Figure 45 shows the rail used in New York City on newly paved streets, in the underground conduit construction. It will be noticed that the flange is only 5-32 of an inch below the head.

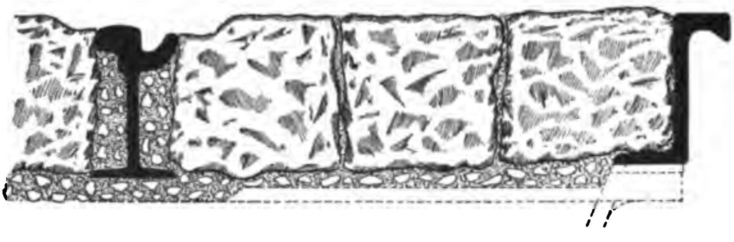


FIGURE 47.

As the streets on which it is installed are all well paved and kept admirably clean, no difficulty is found in operation.

Figure 44 shows the rail used in Boston on paved streets. This is known as the half grooved rail, the flange being ½-inch below the head. Considerable invitation to vehicles to follow the tracks is extended by this rail.

Figure 43 illustrates the rail used in Brooklyn.

Figure 49 represents a very excellent type of street railway track construction in which "T" rails are laid on concrete beams. Ribbons of dressed granite are laid on each side of and flush with the upper surface of the rails. The granite blocks next to the gage sides of the rails being dressed to form a groove for the passage of the flanges of the car wheels. This type of construction has been developed to the highest degree of perfection in the cities of Minneapolis and St. Paul, where it has been adopted as the standard street railway construction. Where the granite blocks are of good quality, well dressed to uniform dimensions and are properly laid on concrete foundations of sufficient strength, this type of track will give excellent service under moderately heavy vehicular traffic, and there are many streets in Chicago where track construction of this type could be installed with

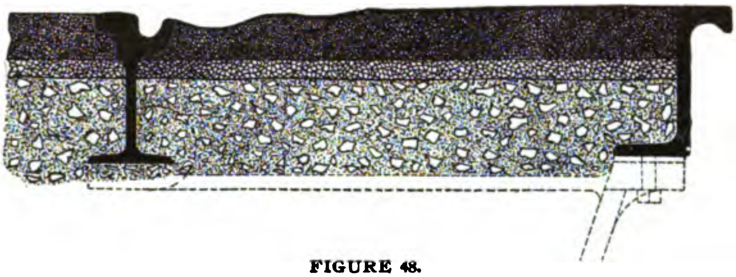


FIGURE 48.

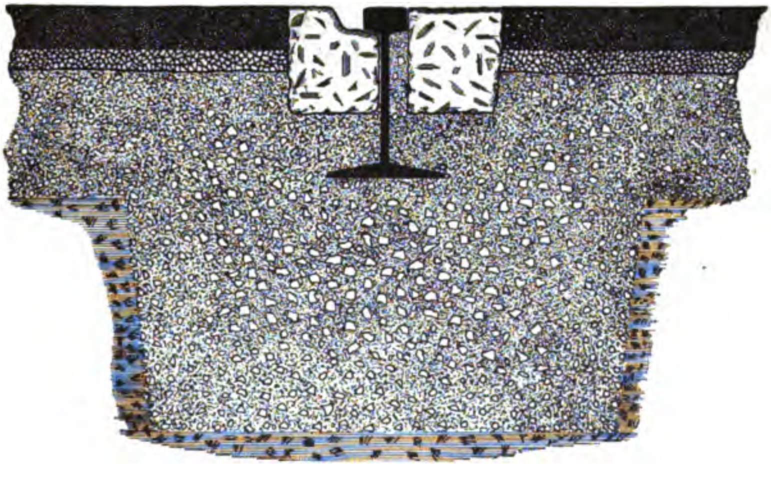


FIGURE 49.

the assurance that it would give satisfactory results to all parties concerned. In a discussion with the officers of the leading asphaltic pavement company of this country, on the subject "Maintenance of Pavement in Streets Occupied by Railway Tracks," I was advised by these gentlemen that in their extended experience in maintaining under guaranty the pavements in such streets, that the most satisfactory results have been obtained in streets where the Minneapolis type of construction has been installed.

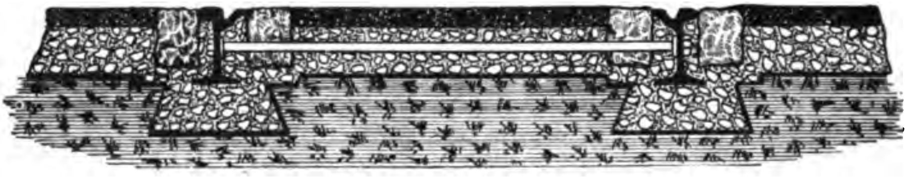


FIGURE 50.

CONCLUSIONS REGARDING RAILS.

Summarized, my conclusions as to the design of track rails which will be practicable for the operation of cars under Chicago conditions and which will best protect the pavements, are as follows:

FIRST—For the use on streets that are paved with asphalt, brick or dressed granite, and where such pavements are kept clean, I recommend a rail, a section of which is shown in Figure 30, laid on concrete beam, as shown in Figure 50, believing that the use of such a rail, under such conditions, is practicable from the street railway operating point of view and believing that such a rail will tend to cause vehicle traffic to distribute itself over the whole street surface (thus preventing abnormal wear in one spot), extending, as it does, the least invitation to vehicles to follow the tracks.

SECOND—On unpaved and on poorly maintained paved streets and on streets that are indifferently cleaned, the present girder tram section should be retained to be replaced only as it wears out or as streets are improved with asphalt, brick or dressed granite paving.

THIRD—By the adoption of the foregoing recommendations I am confident that the best interests of the citizens and the municipality will be served, and no unnecessary hardship will be imposed upon the Street Railway Companies.

CEMENT OR CONCRETE ROAD BEDS.

In reference to the desirability and cost of laying cement roadbeds for street car tracks.

Under the present operation of 25-ton electric motor cars, and considering the nature of the soil of Chicago, in order to obtain an absolutely unyielding foundation on which to lay tracks, it is *necessary* to lay cement concrete road-beds. While the first cost of track construction is very largely increased thereby it is economy in the end for railway companies to adopt such practice. The cost of maintenance is reduced to the minimum and the street surface retains its even contour indefinitely thus securing the greatest life possible.

A further advance in the use of concrete in track construction has been made in dispensing with wooden cross ties altogether and supporting the rails on concrete foundations, burying the rail in concrete to the underside of the paving material, the rails being kept to gage by tie rods placed in the track at frequent intervals. The most approved practice in the use of concrete foundations is to lay the rails on longitudinal beams of Portland cement concrete, these beams being a part of the concrete foundation supporting the pavement. This method of construction is shown in Figures 49 and 50, and if carried out with good material produces a substantial track which can be maintained under heavy traffic at a minimum cost and is most favorable for laying and maintaining street pavements.

Unit Price Estimate I, Page 193,is an estimate of the cost of one mile of single track constructed after such practice and using the design of rail recommended and shown in Figure 30, Page 174.

PART VI.—CHAPTER VI.

UNIT PRICE ESTIMATES.

Introductory.

In order to comply with the conditions of my commission regarding the valuation of the present properties and the probable cost of the future properties, analyzed in this report, it has been necessary to formulate a series of *unit price estimates* arranged in such a manner that they could be applied to any one of the various valuation questions involved.

These unit price estimates will be found on pages 185 to 195 of this chapter and have been used in arriving at the values given in Chapters VII, VIII and IX under the titles of "Valuation Estimates," "Valuation of Lines Under Expiring Grants" and "Cost Estimates."

In making valuation estimates I have found it advisable, in order to enable one to make an intelligent analysis of the valuation of the different properties, to make my estimates on two different bases with the object in view of determining the physical value of the properties as they exist today, which I understand is what is meant by my commission "to make a valuation of present plants." The estimates have, therefore, in Chapter VII, been made in two columns, headed as follows:

A.—The cost to reproduce the properties today.

The figures in this column are based upon what it would cost to furnish and install the materials entering into the construction of the properties today, and in considering these prices it should be borne in mind that the state of the art is now such that a large amount of the physical part of the properties, as they exist, could be built now much cheaper than was possible at the time they were built. This applies especially to the cable systems which, at the time they were installed, were largely built under patented systems, and from special designs, and at a time when engineers were not familiar enough with the requirements of cable railway work to definitely determine what should be done at the time an installation was made. The result was that some of the systems were built in a much more expensive manner than subsequent experience proved necessary. Another result was that some of the plants were built too light for the service, and had to be completely torn out and re-installed at a largely increased expense. Such for example is the Washington Street Power House of the West Side System, which was installed and started in operation and found to be so small that it could not operate the cars. A new plant, adjacent to it, was constructed, and the machinery originally designed completely discarded and new and heavier machinery installed. These conditions also govern, to a certain extent, the introduction of the electric plants, some of which were built with belted machinery, in order to utilize the class of machinery available at the time, with the result that the power stations cover so large a ground area that the cost of the buildings and foundations and transmission apparatus, even though now almost obsolete, made the plants complete cost almost as much per electrical unit as the more modern plants now cost.

B.—Present value of the physical property for electric railway purposes.

This column gives the present values of the physical properties *for electrical railway purposes* so far as I am able to estimate them. In deducing this column it has been necessary to take into consideration the fact that the cable systems complete, exclusive of track, real estate and buildings, must be considered as practically obsolete, and that, therefore, the only amounts that they can be credited with is what salvage can be obtained from their disposition. I have, however, considered that some portions of the cable tracks, outside of the business center, where underground conduit construction would not be required, could be used to operate electric cars over, provided the tracks were surfaced up and brought into good physical condition. For these reasons I have credited the cable systems, in each case, with the estimated value that it would cost to reproduce these cable tracks as new electric car tracks, taking into consideration the weight of the rail in each case, and allowing a suitable depreciation from the figure thus obtained, depending upon the condition in which the track and paving have been maintained by the respective companies. I have endeavored to estimate this depreciation as fairly as possible, and while it may seem difficult to understand how it can have been so great, it should be accepted as one of the conditions due to the advancement of the art in street railways, and is illustrative of the conditions which must be faced by any corporation or municipality which engages in the transportation business. The same statements are largely true regarding a large part of the electrical equipment of some of the present companies, for the reason that the electrical art has so far advanced, since some of the present properties were built, that a part of their electrical and steam equipment is, from the standpoint of economical operation, obsolete today. In considering this valuation column it must be understood that it does not in any sense purport to be the actual value, from a business standpoint, of the properties estimated, for the reason that ordinarily from a business and financial standpoint the value of all properties having franchise rights would be based largely upon their earning capacity, and not upon the mere physical value of the tangible property.

UNIT PRICE ESTIMATE A.

Estimate of cost to produce one mile of single track cable construction of the type now installed in the North and South Divisions, and on the Madison Street and Milwaukee Avenue systems, in the West Division.

5095	lineal feet of straight track at $10.70 per ft.	$54,516.50
185	lineal feet of curved track at $35.00 per ft.	6,475.00
5280		$60,991.50

Includes rails, yokes, joints, tie rods, manhole covers and frames, curve wheels, frames and covers, tubing, excavating, concreting, paving and labor.

Pulley wheels and supports, 170 per mile, at $5	$ 850.00
Proportion of special track work per mile	5,000.00
Proportion of cost for vault construction	4,500.00
Moving and reconstructing underground obstructions	7,134.00
	$78,475.50
Engineering, supervision and administration 10 p. c.	7,847.55
Total, including paving	$86,323.05

UNIT PRICE ESTIMATE B.

Estimate of cost to produce one mile of single track cable construction of the type now installed on the Blue Island Avenue and Halsted Street system in the West Division.

5095	lineal feet of straight track at $9.35 per foot	$47,638.25
185	lineal feet of curved track at $25 per foot	4,625.00
5280		$52,263.25

Includes rails, yokes, joints, tie rods, manhole covers and frames, curve wheels, frames and covers, excavating, concreting, paving and labor.

Pulley wheels and supports, 170 per mile, at $5	$ 850.00
Proportion of special track work per mile	5,000.00
Proportion of cost for vault construction	3,726.00
Moving and reconstructing underground obstructions	6,000.00
	$67,839.25
Engineering, supervision and administration 10 p. c.	6,783.92
Total, including paving	$74,623.17

UNIT PRICE ESTIMATE C.

Estimate of cost to produce one mile of single track, 4½-inch girder rail, on chair supports, ties on earth foundations.

Steel rails, 65 pounds per lineal yard, 102.14 gross tons, at *$41 per ton	$ 4,187.74
Ties, 2640, at 55c delivered on street	1,452.00
Tie rods, 700, at 25c	175.00
Chairs, 5280, at 50c	2,640.00
Spikes	150.00
Hauling rails to street, at $1 per ton	102.14
Joints, 352 cast welded, at $3	1,056.00
Cross bonding	10.00
Excavation, including bedding of ties, 1549 cu. yds., at 60c.	929.40
Track laying and cleaning street, at 25c per ft	1,320.00
	$12,022.28
Special work at intersections and cross overs average	4,000.00
	$16,022.28
Engineering, supervision and administration 10 p. c.	1,602.22
Total cost of track exclusive of paving	$17,624.50

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*The price of $41 per gross ton for steel rails includes the cost of the rails f. o. b. cars Chicago at $40 per gross ton, and $1 additional to cover switching charges and other costs of handling prior to hauling the rails to the work.

UNIT PRICE ESTIMATE D.

Estimate of cost to produce one mile of single track, 6-inch girder rail, earth foundation.

Steel rails, 78 pounds per lineal yard, 122.57 gross tons, at $41 (see foot note to Estimate C)	$ 5,025.37
Ties, 2640, at 55c delivered on street	1,452.00
Tie rods, 700, at 25c	175.00
Spikes	150.00
Hauling rails to street, at $1 per ton	122.57
Joints, 352, cast welded, at $3.50	1,232.00
Cross bonding	10.00
Excavation, including bedding of ties, 1158 cu. yds., at 60c.	694.80
Track laying and cleaning street per foot, at 25c	1,320.00
	$10,181.74
Special work at intersections and cross-overs, average.	4,000.00
	$14,181.74
Engineering, supervision and administration 10 p. c.	1,418.17
Total cost of track exclusive of paving	$15,599.91

UNIT PRICE ESTIMATE E.

Estimate of cost to produce one mile of single track, 7-inch girder rail, earth foundation.

Steel rails, 85 pounds per lineal yard, 133.57 gross tons, at $41 (see foot note to Estimate C.)	$ 5,476.37
Ties, 2640, at 55c delivered on street	1,452.00
Tie rods, 700, at 25c	175.00
Spikes	150.00
Hauling rails to street, at $1 per ton	133.57
Joints, 352, cast welded, at $3.50	1,232.00
Cross bonding	10.00
Excavation, including bedding ties, 1374 cu. yds., at 60c.	824.40
Track laying and cleaning street per foot, at 25c	1,320.00
	$10,773.34
Special work at intersections and cross-overs, average.	4,000.00
	$14,773.34
Engineering, supervision and administration 10 p. c.	1,477.33
Total cost of track exclusive of paving	$16,250.67

UNIT PRICE ESTIMATE F.

Estimate of cost to produce one mile of single track, 9-inch girder rail, earth foundation.

Steel rails, 94 pounds per lineal yard, 147.71 gross tons, at $41 (see foot note to Estimate C.)	$ 6,056.11
Ties, 2640, at 55c delivered on street	1,452.00
Tie rods, 700, at 25c	175.00
Spikes	150.00
Hauling rails to street, at $1	147.71
Joints, 352, cast welded, at $5	1,760.00
Cross bonding	10.00
Excavation, including bedding ties, 1549 cu. yds., at 60c.	929.40
Track laying and cleaning street, at 25c per ft.	1,320.00
	$12,000.22
Special work at intersections and cross-overs, average.	4,000.00
	$16,000.22
Engineering, supervision and administration at 10 p. c.	1,600.02
Total cost of track exclusive of paving	$17,600.24

UNIT PRICE ESTIMATE G.

Estimate of Cost to Produce One Mile of Double Track Overhead Trolley Construction.

100	Iron poles, set in concrete, at \$28	\$ 2,800.00
50	4-pin iron cross arms, with pins and ins., at \$3.95.	197.50
100	Small Brooklyn insulators for spans, at 50c	50.00
100	Globe strain insulators for spans, at 22c	22.00
90	Straight line hangers, at 32½c	29.25
10	Feed-in hangers, at 50c	5.00
140	Soldered 9-inch ears, at 16c	22.40
12	Live cross-overs (estimated), at \$3	36.00
8	Insulated cross-overs (estimated), at \$6	48.00
8	2-way frogs (estimated), at \$3	24.00
3000	Feet 5-16 inch galv. strand wire for spans, at \$10 per M.	30.00
6	Strain plates (strain layout), at 32c	1.92
12	Small Brooklyn (strain layout), at 50c	6.00
12	Globe insulators (strain layout), at 22c	2.64
1500	Feet ¼-inch galv. strand wire (strain layout), at \$7.25 per M	10.88
20	Double hangers (2 double curve layout), at 44c.	8.80
20	Single hangers (2 double curve layouts), at 35c.	7.00
1000	Feet ¼-inch strand wire (2 double curve layouts), at \$7.25 per M	7.25
4	Heavy Brooklyn (2 double curve layouts), at 70c.	2.80
10560	Feet 2-0 trolley wire, 4246 pounds, at 13¼c	562.59
2	2-0 splicing ears, at 50c	1.00
	Labor, placing spans, trolleys, etc	225.00
	Total cost exclusive of feeder wire	\$ 4,100.03
	Cost of feeder wire estimated average per mile.	4,000.00
		\$ 8,100.03

UNIT PRICE ESTIMATE H.

Estimate of cost to pave one mile of single track, 8 feet in width.

1.	Dressed Granite, city specifications: On 6-inch concrete base, 4600 square yards, at $4 per yard	$18,400.00
2.	Asphalt: On 6-inch concrete base, 4600 square yards, at $2.80 per yard	12,880.00
3.	Vitrified Brick: On 6-inch concrete base, 4600 square yards, at $2.75 per yard	12,650.00
4.	Cedar Blocks: On plank and sand, 4600 square yards, at $1.48 per yard	6,808.00
5.	Rough Granite: On sand bedding, 4600 square yards, at $2.50 per yard	11,500.00
6.	Cobble Stone: Bedded in gravel, 4600 square yards, at $1.65 per yard	7,590.00
7.	Macadam: 4600 square yards, at 75c per yard	3,450.00
8.	Oak Blocks: On plank and sand, 4600 square yards, at $1.70 per yard	7,820.00

UNIT PRICE ESTIMATE I.

Estimate of cost to produce one mile of single track, grooved girder rail of design Figure 30, submitted and recommended, laid on concrete beams, Figure 50.

Excavation and hauling, 2000 cubic yards, at $1	$ 2,000.00
*Concrete beams, 800 cubic yards, at $6	4,800.00
Steel rails, 120 pounds per yard, 188.57 tons, at $41 (see foot note to Estimate C.)	7,731.37
Hauling rails to street at $1	188.57
Tie rods, 700, at 25c	175.00
Cast welded joints, 176, at $5	880.00
Cross bonding	10.00
Track laying, cleaning street, etc.	1,501.44
Special track work per mile of single track	4,500.00
Engineering, supervision and administration, 10 per cent	2,178.63
Total cost of track exclusive of paving	$23,965.01
If paved with asphalt	$36,845.01
If paved with dressed granite	42,365.01
If paved with brick	36,615.01
Cost of Paving—	
Asphalt on 6-inch concrete base	12,880.00
Dressed granite on 6-inch con. base	18,400.00
Vitrified brick, on 6-inch con. base	12,650.00

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*These estimates fix the price of concrete in place at six dollars per cubic yard. The price of concrete varies with the variations in the market price of cement and other materials, and with the varying conditions under which the work must be executed. The price of six dollars per cubic yard is considered to be a safe average price for the purposes of these estimates.

UNIT PRICE ESTIMATE J.

Estimate of Cost to Produce One Mile of Single Track, Underground Electric Conduit Type, Grooved Girder Rail of Design Figure 30.

Steel track rails, 120 lb. per yd., 188.57 tons at $41 (see foot note to Estimate C.)	$ 7,731.37
Steel Slot Rails, 66 lb. per yd., 103.71 tons at $43	4,459.53
Conductor bars, 21.3 lb. per yd., 33.47 tons at $43	1,439.21
352 cast weld joints at $5	1,760.00
352 Slot Rail Splices with bolts	82.00
Bolts (tram rail, slot rail, hand hole, insulator, hatch, washers and keys)	492.00
Tie bars, 4,200 at 25c	1,050.00
Insulators and clips	1,200.00
Cast iron yokes, pit covers and frames, conduit plates, 310 tons at $50	15,500.00
Hauling iron work	600.00
Special track work per mile single track	6,000.00
Conductor bonds	500.00
Track laying and placing iron work, per mile	7,260.00
Excavation 2,700 cu. yds. at $1	2,700.00
Concrete, 1,500 cu. yds., at $6	9,000.00
Sewer connections from manholes, etc.	2,000.00
Removing and rearranging underground obstructions.	7,000.00
Cable ducts in place	1,500.00
Plus for engineering, supervision, administration, 10 per cent	7,027.41
Total estimated cost per mile of single track, exclusive of paving	$77,301.52
Cost of feeder wire, estimated average per mile	4,000.00
	$81,301.52

If paved with asphalt, single track road would cost per mile	$94,181.52
If paved with dressed granite, single track road would cost per mile	99,701.52
If paved with brick, single track road would cost per mile	93,951.52

Cost of Paving—

Asphalt on 6-in. concrete base	$12,880
Dressed granite on 6-in. concrete base	18,400
Vitrified brick on 6-in. concrete base	12,650

The above unit price per mile for underground conduit work is a safe average figure for a system covering the city at large, for in outlying districts the price should not exceed $70,000 per mile, and for all work located in the business district the price should be raised to about $100,000 per mile, both exclusive of paving, owing to the increased amount of underground obstructions, the extra cost of labor due to congestion of traffic, and the large amount of curves and special work which will be required within this terminal district.

On streets now occupied by cable construction, the cost, in either case, would be reduced by about $3,000 per mile, derived from sale of old material.

PART VI.—CHAPTER VII.

VALUATION ESTIMATES.

VALUATION ESTIMATE NO. 1.

Estimate of Cost to Reproduce New, and Present value for Electric Railway purposes of the Physical Property of the Chicago City Railway Co. See Discussion on Estimates, beginning on page 182.

TRACKS, PAVING AND TROLLEY CONSTRUCTION.	A. Estimated Cost to Reproduce the Physical part of the present property at present market prices for labor, material and Equipment.	B. Present value of the Physical Property for Electric Railway Purposes, to any person or corporation in position to utilize it, in place, and sell for cash those parts which have become obsolete. This does not take into consideration the value of the franchises or the earning capacity of the property.
34.75 Miles of Cable, single track (as per Appendix G, at $86,323.05 per mile as per unit price Estimate "A")........	$ 2,999,725.99	$ 964,335.78
185.25 Miles of Electric and Horse, single track, as per Appendix "G"		
37.40 Miles 4½ in. rail at $17,624.50 unit price Estimate "C".............	659,156.30	164,894.83
111.13 Miles 7 in. rail at $16,250.67 unit price Estimate "E".................	1,805,936.96	70 1,625, 3.27
36.72 Miles 9 in. rail at $17,600.24 unit price Estimate "F".................	646,280.81	581,652.73
Overhead Trolley Electrical Construction on 183.38 miles of single electric track at $8,100.03 per mile of double track, including feeder wire and rail return circuit as per unit price Estimate "G".	742,691.75	668,422.57

VALUATION ESTIMATE NO. 1.—Continued.

TRACKS, PAVING AND TROLLEY CONSTRUCTION.—Continued.	A.	B.
Miles of single track paving:		
146.37 Granite at $11,500 unit price Estimate *H 5*..................	1,683,255.00	1,599,092.25
4.31 Brick at $12,650 unit price Estimate *H 3*....................	54,521.50	49,069.35
23.29 Cedar at $6,808 unit price Estimate *H 4*....................	158,558.32	105,705.55
11.28 Macadam at $3,450 unit price Estimate *H 7*....................	38,916.00	38,916.00
185.25	$ 8,789,042.63	$ 5,797,326.58

THREE CABLE STATIONS.

Capacity of three Stations, consisting of simple, horizontal, noncondensing engines and return tubular boilers, totalizing 10,818 engine horse power or 5,400 boiler horse power, including boilers, piping, engines, pumps, heaters, and all accessories pertaining to the steam plant required for Cable operation, but exclusive of the winding machinery, building and land

	A.	B.
At $40 per engine horse power or At $80.60 per boiler horse power..	$432,720	$70,274
Winding machinery, tension carriages, pits, subways, sheaves, etc., and all accessories thereto at $30 per H. P. of engine capacity.............	324,540	Will cost as much to remove as it will sell for.
Building, stack and foundations at $18 per engine horse power...............	194,724	$97,362

THREE ELECTRIC STATIONS.

10,280 K. W. capacity at $90 per K. W. for Boilers, Engines, Generators, piping, pumps, switchboards, and all accessories necessary to the operation of an Electrical power plant, including building and exclusive of land. Simple, horizontal, non-condensing, belted units and return tubular boiler plant.

		A.	B.
One of 5,280 K. W. at $95....	$501,600		
One of 5,000 K. W. at $85....	$425,000	$926,600	$883,940
1,000 H. P. Storage Battery Plant		70,866	70,866
		$1,949,450	$1,072,442

VALUATION ESTIMATE NO. 1.—Continued.

ROLLING STOCK.

		A.	B.
775	Cable Cars complete in service....	$930,000.00	$155,000.00
512-22	ft. Electric Car bodies, exclusive of trucks, in service......... 60-47 ft. Electric Car bodies, including double truck, in service.......	913,086.40	530,856.40
13	Horse Cars complete in service....	14,300.00	1,300.00
444	Electric Motor Car bodies, open...	399,600.00	222,000.00
8	Mail Cars and trucks in service....	12,000.00	10,000.00
552	Trucks in service................	127,600.00	82,800.00
22	Truck frames....................	3,100.00	2,620.00
332	Temporary Trucks................	16,600.00	8,300.00
1,000	New Stationary fare registers and extra parts..................	15,340.50	15,340.50
65	New Air Brake Equipments.......	19,110.31	19,110.31
53	Work Cars, exclusive of electrical equipment..............	26,500.00	21,200.00
73	Snow sweepers, snow plows and Salt Cars, exclusive of electrical equipment..............	65,800.00	58,400.00
		$2,543,037.21	$1,126,927.21

ELECTRIC AND CABLE CAR EQUIPMENT.

		A.	B.
1,170	Motors and 1,170 Controllers Equivalent to 585 complete cars.........................	$702,000.00	$585,000.00
15	Extra K Controllers.............	1,125.00	1,125.00
5	Extra Motors..................	2,500.00	2,500.00
141	Extra Armatures	21,150.00	21,150.00
125	G. E. and K-6 Controller-4 Motor Electric Equipments	306,250.00	304,960.00
1	Extra Controller...............	200.00	150.00
	Grips	20,720.00	2,000.00
		$1,053,945.00	$916,885.00

TOOLS, IMPLEMENTS, SUPPLIES AND MACHINERY.

	A.	B.
Per schedule, not previously included....	$37,907.00	$37,907.09
Wagons and Vehicles.................	22,971.00	20,673.00
Harness............................	2,415.00	2,000.00
Office Furniture and Fixtures...........	11,872.00	11,872.00
	$75,165.00	$72,452.90

VALUATION ESTIMATE NO. 1.—Continued.

REAL ESTATE, BUILDINGS AND IMPROVEMENTS.		A.	B.
Board of Review Valuation 1902.			
Real Estate		$628,059.00	$628,059.00
Buildings	$1,560,295.00		
Less Amount of Buildings included in foregoing Estimates	325,000.00	1,235,295.00	1,235,295.00
		$1,863,354.00	$1,863,354.00

SUMMARY.

	A.	B.
Tracks	$8,789,042.63	$5,797,326.58
Power Plants	1,949,450.00	1,072,442.00
Rolling Stock	2,543,037.21	1,126,927.21
Car Equipment	1,053,945.00	916,885.00
Tools, Implements, Supplies and Machinery not heretofore listed	75,165.00	72,452.90
Board of Review Valuation of 1902.		
Real Estate	628,059.00	628,059.00
Buildings and Improvements	1,235,295.00	1,235,295.00
	$16,273,993.84	$10,849,387.69

To the above should be added the following Capital Expenditures for new investments made since Dec. 31, 1901, (the date upon which the preceding schedules were compiled) and Nov. 1st, 1902.

		A.	B.
Track	$132,007.00	898,431.00	898,431.00
New Power Plant, 21st and Dearborn Sts.	116,513.00		
Rolling Stock	191,101.00		
Real Estate	70,565.00		
Buildings and Shops	388,245.00		
		$17,172,424.84	$11,747,818.69

ANALYSIS OF DEPRECIATION.

Cable, Track and Paving	$2,035,390.21	
Cable Steam Plants	362,446.00	
Cable Winding Machinery	324,540.00	
Cable Buildings	97,362.00	
Cable Rolling Stock and Grips	793,720.00	$3,613,458.21
Electric and Horse Track	739,589.00	
Electric Overhead Trolley Equipment	74,269.17	
Electric and Horse Track Paving	142,467.67	
Electric Stations	92,660.00	
Electric and Horse Rolling Stock	641,110.00	
Electric Car Equipment	118,340.00	
Tools, Implements, Supplies and Machinery	2,712.10	1,811,147.94
Total		$5,424,606.15

VALUATION ESTIMATE NO. 2.

Estimate of Cost to reproduce New and Present Value for Electric Railway Purposes of the Physical Property of the Chicago Union Traction Company. See discussion on Estimates, beginning on page 182.

TRACKS, PAVING AND TROLLEY CONSTRUCTION.	A. Estimated Cost to reproduce the Physical part of the present property at present market prices for labor, material and equipment.	B. Present value of the Physical Property for Electric Railway Purposes, to any person or corporation in position to utilize it, in place, and sell for cash those parts which have become obsolete. This does not take into consideration the value of the franchises, or the earning capacity of the property.
47.60 Miles of Cable, Single Track (as per Appendix H).		
11.27 Miles at $74,623.17, per unit price Estimate "B"	$841,003.13	$ 234,562.54
36.33 Miles at $86,323.05, per unit price Estimate "A"	3,136,116.41	756,136.38
258.23 Miles of Electric and Horse, Single Track, (as per Appendix "H").		
5.83 Miles, 4½ in. Rail at $17,624,50, unit price Estimate "C"	102,750.83	25,687.70
232.16 Miles 7 in. Rail at $16,250.67, unit price Estimate "E"	3,772,755.55	3,395,480.00
20.24 Miles 9 in. Rail at $17,600.24, unit price Estimate "F"	356,228.86	320,605.98
Overhead Trolley Electrical Construction on 251.11 Miles of single electric track at $8,100.03 per mile of double track, including Feeder Wire, per unit price Estimate "G"	1,016,958.77	915,262.90
Miles of Single Track Paving.		
38.22 Miles Granite at $11,500, unit price Estimate *H 5*	439,530	417,553.50
77.96 Miles Cobble at $7,590, unit price Estimate *H 6*	591,716.40	*591,716.40

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*Cobble stone pavement, instead of wearing out, improves with use, hence has not been depreciated. It is either worth full cost to reproduce or practically nothing, depending upon whether its use is permitted or not.

VALUATION ESTIMATE NO. 2.—Continued.

TRACKS, PAVING AND TROLLEY CONSTRUCTION.—Continued.	A.	B.
5.36 Miles Brick at $12,650, unit price Estimate *H 3*	67,804.00	61,023.60
5.70 Miles Asphalt at $12,880, unit price Estimate *H 2*	73,416.00	66,074.40
.33 Miles Macadam at $3,450, unit price Estimate *H 7*	1,138.50	1,138.50
124.80 Miles Cedar at $6,808, unit price Estimate *H 4*	849,638.40	566,425.60
5.86 Miles Oak at $7,820, unit price Estimate *H 8*	45,825.20	30,550.14
258.23	$11,294,882.05	$7,382,217.64

EIGHT CABLE STATIONS.

Capacity of eight Stations, consisting of simple, horizontal, non-condensing engines and return tubular boilers, totalizing 15,550 engine Horse Power, or 8,100 boiler Horse Power, including boilers, piping, engines, pumps, heaters and all accessories pertaining to the steam plant required for cable operation, but exclusive of the winding machinery, buildings and land. At an average price for all stations of $40.00 per Engine H. P. or 76.75 per Boiler H. P.	$622,000	$102,050
Winding machinery, tension carriages, pits, subways, sheaves, etc., and all accessories thereto at $40.80 per H. P. of engine capacity	$634,000	Will cost as much to remove as it will sell for.
Buildings, stack and foundations, at $47 per Engine Horse Power	731,000	365,500
Add for Miscellaneous Electric Lighting Plants in Stations	20,000	
	$2,007,000	$467,550.00

TWO ELECTRIC STATIONS.

12,150 K. W. Capacity, including Boilers, Engines, Generators, piping, pumps, switchboards and all accessories necessary to the operation of an Electrical power plant, including building and exclusive of land. Station 3,900 K. W. Capacity: Compound, horizontal, condensing, direct connected units and return tubula boiler plant at $120.50 per K. W.	470,224.98	423,202.49

VALUATION ESTIMATE NO. 2.—Continued.

TWO ELECTRIC STATIONS.—Continued.

	A.	
1 Station 8,250 K. W. Capacity: Compound, horizontal, non-condensing, direct connected units and water tube boiler plant at $92.35 per K. W.	761,892.03	685,702.83
	$3,239,117.01	$1,576,455.32

ROLLING STOCK.

611 Box Motor Cars complete with trucks, at $1,200..............$	733,200.00	$ 502,000.00
472 Open Motor Cars complete with trucks, at $1,000...............	472,000.00	372,400.00
594 Box Trailers, Cable and Electric, with trucks complete, at $1,000.	594,000.00	118,800.00
699 Open Trailers, Cable and Electric, with trucks complete, at $800..	559,200.00	139,800.00
299 Grip Cars, complete with trucks and grips, at $1,200............	358,800.00	29,900.00
176 Snow Cars, Mail Cars and Work Cars, at $700.................	123,200.00	110,880.00
	$2,840,400.00	$1,273,780.00

ELECTRIC CAR EQUIPMENT.

80-4 Motor Equipments, complete, at $1,400.......................$	112,000.00	$ 100,800.00
491-2 Motor Equipments, complete, at $600........................	294,600.00	265,140.00
50-2 Motor Equipments, complete, at $1,000.......................	50,000.00	45,000.00
	$456,600.00	$410,940.00

TOOLS, IMPLEMENTS, SUPPLIES AND MACHINERY.

Per schedule, not previously included...$	899,404.96	$ 809,464.47

REAL ESTATE, BUILDINGS AND IMPROVEMENTS.

Board of Review valuation, 1902. Real Estate.....................$		2,161,258.00	$ 2,161,258.00
Buildings............$	2,272,673.00		
Less amount of Buildings included in foregoing Estimate.....$	949,700.00	1,322,973.00	1,322,973.00
		$3,484,231.00	$3,484,2310.0

VALUATION ESTIMATE NO. 2.—Continued.

SUMMARY.	A.	B.
Tracks	$11,294,882.05	$ 7,382,217.64
Power Plants	3,239,117.01	1,576,455.32
Rolling Stock	2,840,400.00	1,273,780.00
Car Equipment	456,600.00	410,940.00
Tools, Implements, Supplies and Machinery	899,404.96	809,464.47
Board of Review valuation, 1902.		
Real Estate	2,161,258.00	2,161,258.00
Buildings and Improvements	1,322,973.00	1,322,973.00
	$22,214,635.02	$14,937,088.43

These figures do not include the Van Buren Street Tunnel which is owned by the West Chicago Street Railroad Tunnel Co. It would cost about $800,000 to reproduce it, but the value for electric railway purposes is dependent upon the advisability of using it in connection with a subway system, and if so used one-half the cost to reproduce it could probably be realized.

ANALYSIS OF DEPRECIATION.

Cable, Track and Paving	$2,986,420.62	
Cable, Steam. Plants	539,950.00	
Cable, Winding Machinery	634,000.00	
Cable, Buildings	365,500.00	
Cable, Rolling Stock and Grips	1,223,500.00	$5,749,370.62
Electric and Horse Track	489,961.56	
Electric Overhead Trolley Equipment	101,695.87	
Electric and Horse Track Paving	334,586.36	
Electric Stations	123,211.69	
Electric and Horse Rolling Stock	343,120.00	
Electric Car Equipment	45,660.00	
Tools, Implements, Supplies and Machinery	89,940.49	1,528,175.97
Total		$7,277,546.59

COMBINED SUMMARY OF VALUATION ESTIMATES

Nos. 1 and 2.

Cable Plant.	Chicago City Ry. Co.		Chicago Union Traction Co.
Cost to reproduce per Column A.			
Tracks and Paving	$2,999,725.99		$3,977,119.54
Steam Plants	423,720.00		642,000.00
Winding Machinery	324,540.00		634,000.00
Buildings	194,724.00		731,000.00
Rolling Stock and Grips	950,720.00		1,512,000.00
	$4,902,429,99		$7,496,119.54
Depreciation $73\frac{70}{100}\%$	3,613,458.21	$76\frac{70}{100}\%$	5,749,370.62
	$1,288,971.78		$1,746,748.92
Electric Plant.			
Electric and Horse Track	$3,111,374.07		$4,231,735.24
Electric Overhead Trolley Equip.	742,691.75		1,016,958.77
Electric and Horse Track Paving,	1,935,250.82		2,069,068.50
Electric Station,	997,466.00		1,232,117.01
Electric and Horse Rolling Stock,	1,613,037.21		1,328,400.00
Electric Car Equipment	1,033,225.00		456,600.00
Tools, Implements, Supplies and Machinery	75,165.00		899,404.96
	$9,508,209.85		$11,234,284.48
Depreciation $19\frac{04}{100}\%$	1,811,147.94	$13\frac{60}{100}\%$	1,528,175.97
Present Physical Value	$7,697,061.91		$9,706,108.51
Land and Buildings	1,863,354.00		3,484,231.00
New Work	898,431.00		
Total to produce	$17,172,424.84		$22,214,635.02
Total Depreciation, $31\frac{60}{100}\%$	5,424,606.15	$32\frac{75}{100}\%$	7,277,546.59
Present Physical Value	$11,747,818.69		$14,937,088.43

PART VI.—CHAPTER VIII.

VALUATION OF LINES UNDER EXPIRING GRANTS.

Reporting on the requirement "To make an estimate of the value of all lines, the franchises of which do not expire in 1903," the following is submitted.

To make such as estimate involves a determination as to what lines do expire on or before July 30th, 1903. I have used the report of the Special Council Committee of date March 28, 1898, for the data relative to ordinances and have prepared a number of schedules based on the report. That report claims as expiring or terminable in 1903 the grants which, according to the contention of the companies, were extended until 1958, by the so-called "99-year act."

The schedules are divided into three sections, viz.: Streets on which tracks of the Chicago City Railway Company are laid, streets on which tracks of the *North Division* system of the Chicago Union Traction Company are laid, and streets on which tracks of the *West Division* system of the Chicago Union Traction Company are laid.

Each of these sections is sub-divided into six parts,—three, covering grants made prior to July 30, 1883; two, covering grants made subsequent to July 30, 1883, and one, covering streets on which no record of grants can be found.

The three parts covering grants made prior to July 30, 1883, show:

First.—Those grants where time of duration, specified in the grant, causes them to expire on or before July 30, 1903

Second.—Those grants having special provisions relative to purchases by the city.

Third.—Those grants in which no time of duration is specified.

The two parts covering grants made subsequent to July 30, 1883, show:

First.—Those grants where time of duration specified in the grant causes them to expire or on before July 30, 1903.

Second.—Those grants in which no time of duration is specified.

The estimated cost or value of the lines embraced in each schedule is computed separately.

The totals of any one of these schedules, or the totals of any combination of these schedules, or the sum of all of these schedules (as it may best answer the purpose at the time of consideration), deducted from the estimated value of all lines as shown by columns A of Valuation Estimates (1 or 2), or from columns B, if depreciation is taken into account, answers the requirement "To make an estimate of the value of all lines, the franchises of which do not expire in 1903." All estimates in this chapter are based upon the Unit Price Estimates used in columns A of Valuation Estimates 1 or 2.

SCHEDULE X. A.

Grants made prior to July 30, 1883, on streets now occupied by Tracks of CHICAGO CITY RAILWAY COMPANY, where *time of duration causes them to expire on or before July 30, 1903* Listed as expiring July 30, 1903, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street.	Feet of Single Track.
Clark Street	Washington Street	Polk Street	4,000	8,000
18th Street	Wabash Avenue	Indiana Avenue	945	1,890
Indiana Avenue	18th Street	Cottage Grove Ave.	1,848	3,696
Note: Above prior to "99 Year" Act.				
Van Buren Street	State Street	Wabash Avenue	467	934
Indiana Avenue	39th Street	51st Street	7,788	15,576
51st Street	Indiana Avenue	Grand Boulevard	1,112	2,224
Lake Street	Wabash Avenue	State Street	400	800
State Street	39th Street	55th Street S. T.	10,560	10,560
State Street	55th Street	63rd Street S. T.	5,345	5,345
			32,465	49,025

Feet of Street............32,465=6.15 Miles.
Feet of Cable Track.....15,905=3.00 Miles.
Feet of Electric Track...33,120=6.28 Miles.
Feet of single track......49,025=9.28

ESTIMATED COST OR VALUE.

3.00 Miles Cable Track per unit price Est. "A" at	$86,323.05 =	$258,969.15
6.28 Miles Electric Track per unit Val. Est. 1, average price	16,796.00 =	105,478.88
6.28 Miles Paving per Val. Est. 1, average price	10,447.00 =	65,607.16
6.28 Miles Overhead Electric Construction, per unit price Est. G at $8,100 per mile D. T.	=	25,434.09
		$455,489.28

SCHEDULE X. B.

Grants made prior to July 30, 1883, on Streets now occupied by Tracks of the CHICAGO CITY RAILWAY COMPANY, in which the provisions appeared, *for 25 years, and thereafter, until City purchase plant and equipment, or for 20 years and until Council order for private purchase.* Listed as Expiring July 30, 1903, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street	Feet of Single Track
State Street	Lake Street	31st Street	16,896	33,792
22nd Street	State Street	Cottage Grove Ave.	1,385	2,770
Cottage Grove Ave.	22nd Street	31st Street	5,280	10,560
Archer Avenue	State Street	Halsted Street	6,232	12,464
Note: Above prior to "99 Year" Act.				
Halsted Street	So. Br. Chi. River	39th Street	9,822	19,644
Wabash Avenue	Madison Street	Lake Street S. T.	1,300	1,300
			40,915	80,530

Feet of Street..........40,915= 7.75 Miles.
Feet Cable Track.......47,502= 9.00 Miles.
Feet Electric Track.....33,028= 6.25 Miles.
Feet Single Track......80,530=15.25 Miles.

ESTIMATED COST OR VALUE.

9.00 Miles Cable Track per unit price Est. "A" at $86,323.05 = $776,907.45
6.25 Miles Electric Track per valuation Est. No. 1, average price .... 16,796.00 = 104,975.00
6.25 Miles Paving per valuation Est. No. 1, average price .... 10,447.00 = 65,293.75
6.25 Miles Overhead Electric Construction, per unit price Est. G at $8,100.03 per mile D.T. = 25,272.00

$972,448.20

SCHEDULE X. C.

Grants made prior to July 30, 1883, on Streets now occupied by Tracks of CHICAGO CITY RAILWAY COMPANY, *where no time of duration is specified.* Listed as expiring at will of City, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street	Feet of Single Track
18th Street	State Street	Wabash Avenue	410	820
Indiana Avenue	22nd Street	39th Street	10,537	21,074
Note: Above prior to "99 year" Act.				
Clark Street	Polk Street	22nd Street	7,025	14,050
Wabash Avenue	Madison Street	22nd Street	10,750	21,500
Madison Street	Wabash Avenue	State Street	400	800
State Street	41st Street	61st Street S. T.	13,166	13,166
Wentworth Ave.	61st Street	63rd Street	1,056	2,112
63rd Street	Wentworth Ave.	Stewart Avenue	1,315	2,630
39th Street	Cottage Grove Ave.	State Street S. T.	5,306	5,306
			49,965	81,458

Feet of Street..........49,965= 9.46 Miles.
Feet of Cable Track ....35,066= 6.64 Miles.
Feet of Electric Track ..46,392= 8.79 Miles.
Feet of Single Track....81,458=15.43 Miles.

ESTIMATED COST OR VALUE.

6.64 Miles Cable Track per unit price Est. "A" at	$86,323.05 =	$573,185.05
8.79 Miles Electric Track per valuation Est. 1 at average price	16,796.00 =	147,636.84
8.79 Miles Paving per valuation Est. 1 at average price	10,447.00 =	91,829.13
8.79 Miles Overhead Electric Construction per unit price Est. G at $8,100.03 per mile of D.T.	=	35,559.00
		$848,210.02

SCHEDULE X. D.

Grants made subsequent to July 30, 1883, on Streets now occupied by Tracks of CHICAGO CITY RAILWAY COMPANY, where *time of duration causes them to expire on or before July 30, 1903.* Listed as expiring July 30, 1903, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street.	Feet of Single Track.
Archer Avenue	Halsted Street	Western Avenue	13,200	26,400
Pitney Avenue	Archer Avenue	31st Street	13,800	27,600
31st Street	Pitney Avenue	Lake Park Ave.		
Canal Street	Archer Avenue	29th Street	3,352	6,704
29th Street	Canal Street	Wallace Street	875	1,750
Wallace Street	29th Street	39th Street	6,117	12,234
Ashland Avenue	Archer Avenue	39th Street	5,808	11,616
35th Street	Cottage Grove Ave	Rhodes Avenue	982	1,964
21st Street	State Street	Dearborn Street	400	800
Dearborn Street	21st Street	20th Street	400	800
Madison Street	Michigan Avenue	Wabash Ave. S. T.	400	400
Michigan Avenue	Washington Street	Randolph St. S. T.	400	400
Randolph Street	Michigan Avenue	Wabash Ave. S.T.	400	400
			46,134	91,068

Feet of Street..........46,134 = 8.73 Miles.
Feet of Cable Track.....1,200 = .23 Miles.
Feet of Electric Track...89,868 = 17.02 Miles.
Feet of Single Track....91,068 = 17.25 Miles.

ESTIMATED COST OR VALUE.

.23 Miles Cable Track per unit price Est. "A" at	$86,323.05 =	$ 19,854.30
17.02 Miles Electric Track per valuation Est. 1 at average price	16,796.00 =	285,867.92
17.02 Miles Paving per valuation Est. 1 at average price	10,447.00 =	177,807.94
17.02 Miles Overhead Electric Construction per unit price Est. G., at $8,100.03 per Mile of D. T.	=	68,931.00
		$552,461.16

SCHEDULE X. E.

Grants made subsequent to July 30, 1883, on Streets now occupied by Tracks of CHICAGO CITY RAILWAY COMPANY, where ***no time of duration is specified.*** Listed as expiring at will of City, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street	Feet o Single Track
39th Street	State Street	Wentworth A. S.T.	1,306	1,306
Wentworth Ave.	39th Street	63rd Street	15,840	31,680
39th Street	Wentworth Ave.	Halsted Street S.T.	4,014	4,014
61st Street	State Street	Wentworth Ave.	1,306	2,612
47th Street	State Street	Halsted Street	5,280	10,560
State Street	63rd Street	Vincennes Av. S.T.	4,158	4,158
Vincennes Avenue	State Street	69th Street	880	1,760
69th Street	Vincennes Ave	Halsted Street	4,948	9,896
Halsted Street	63rd Street	69th Street	3,828	7,656
Ashland Avenue	39th Street	55th Street	10,560	21,120
69th Street	Halsted Street	Ashland Avenue	5,280	10,560
Wentworth Ave.	63rd Street	Vincennes Ave.	6,336	12,672
69th Street	Ashland Avenue	Leavitt Street	4,680	9,360
Vincennes Avenue	69th Street	79th Street	7,015	14,030
79th Street	Vincennes Avenue	Halsted Street	2,680	5,360
Ashland Avenue	63rd Street	69th Street	6,950	13,900
			85,061	160,644

Feet of Street......... 85,061=16.11 Miles.
Feet of Electric Track. 160,644=30.42 Miles.
Feet of Single Track...160,644=30.42 Miles.

ESTIMATED COST OR VALUE.

30.42 Miles of Electric Track per valuation Est. 1, average price	$16,796.00=	$510,934.32
30.42 Miles of Paving per valuation Est. 1, at average price	10,447.00=	317,797.74
30.42 Miles of Overhead Electric Construction per unit price Est. G., at $8,100.03 per Mile of D. T.	=	123,201.00
		$951,933.06

SCHEDULE X. F.

No Grants found, on streets now occupied by Tracks of CHICAGO CITY RAILWAY COMPANY. Listed as expiring at will of the City, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street.	Feet of Single Track.
Archer Avenue	Western Avenue	38th Street	528	1,056
Ashland Avenue	55th Street	63rd Street	5,305	10,610
Cottage Grove Ave.	31st Street	39th Street	5,280	10,560
Dearborn Street	20th Street	Archer Avenue	200	400
Halsted Street	39th Street	63rd Street	15,840	31,680
Root Street	State Street	Stock Yards	5,696	11,392
State Street	31st Street	39th Street	5,280	10,560
State Street	39th Street	41st Street S. T.	1,058	1,058
State Street	61st Street	63rd Street S. T.	1,320	1,320
47th Street	Halsted Street	Ashland Avenue	5,280	10,560
38th Street	Archer Avenue	Kedzie Avenue	4,752	9,504
39th Street	Cottage Grove Ave.	State Street S. T.	5,319	5,319
39th Street	State Street	Wentw'h Ave S. T.	1,306	1,306
63rd Street	Stewart Avenue	Ashland Avenue	7,920	15,840
			65,084	121,165

Feet of Street..........65,084=12.32 Miles.
Feet of Cable Track.... 23,498= 4.45 Miles.
Feet of Electric Track.. 97,667=18.50 Miles.

Feet of Single Track...121,165=22.95 Miles.

ESTIMATED COST OR VALUE.

4.45	Miles Cable Track per unit price Est. "A" at	$86,323.05 =	$384,137.57
18.50	Miles of Electric Track per valuation Est. 1, average price	16,796.00 =	310,726.00
18.50	Miles of Paving per valuation Est. 1, at average price	10,447.00 =	193,269.50
18.50	Miles of Overhead Electric Construction per unit price Est. "G" at $8,100.03 per mile D. T.	=	74,925.0
			$963,058.07

SCHEDULE XI. A.

Grants made prior to July 30, 1883, on Streets now occupied by Tracks of the NORTH DIVISION SYSTEM of the CHICAGO UNION TRACTION COMPANY, where *time of duration* causes them to expire on or before July 30, 1903. Listed as expiring July 30, 1903, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street	Feet of Single Track
Clark Street	Randolph Street	Washington Street.	450	900
State Street	Lake Street	Center Ch. R.	600	1,200
Clark Street	N. Water Street	Fullerton Avenue	13,728	27,456
Division Street	Clark Street	Clybourn Ave.	2,904	5,808
Clybourn Avenue	Division Street	Racine Avenue	6,996	13,992
Clybourn Avenue	Racine Avenue	Fullerton Avenue	4,092	8,184
Sedgwick Street	Division Street	Center Street.	5,296	10,592
Chicago Avenue	Clark Street	Chicago River	6,732	13,464
Note: Above prior to "99 Year" Act.				
Center Street	Clark Street	Lincoln Avenue	750	1,500
Lincoln Avenue	Center Street	Fullerton Avenue	3,960	7,920
Division Street	State Street	Clark Street	660	1,340
State Street	Michigan Street	Division Street	5,016	10,032
Sedgwick Street	Chicago Avenue	Division Street	2,644	2,644
Market Street	Chicago Avenue	Division Street	2,645	2,645
			56,473	107,657

Feet of Street......... 56,473 = 10.69 Miles.
Feet of Cable Track... 58,613 = 11.10 Miles.
Feet of Electric Track. 49,044 = 9.29 Miles.

Feet of Single Track... 107,657 = 20.39 Miles.

ESTIMATED COST OR VALUE.

11.10 Miles Cable Track per unit price Est. "A" at	$86,323.05 =	$958,185.85
9.29 Miles Electric Track per valuation Est. 2, average price	16,388.00 =	152,244.52
9.29 Miles Paving per valuation Est. 2, average price	8,012.00 =	74,431.48
9.29 Miles Overhead Electric Construction per unit price Est. "G," at $8,100.03 per Mile of D. T		37,584.00
		$1,222,445.85

SCHEDULE XI. B.

Grants made prior to July 30, 1883, on streets now occupied by Tracks of the NORTH DIVISION SYSTEM of the CHICAGO UNION TRACTION COMPANY in which the provision appeared. *Till October 1, 1894, and thereafter, if Company elect, till City purchase line and equipment.* Listed as expiring July 30, 1903, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street.	Feet of Single Track.
5th Avenue	Randolph Street	Chicago River	1,000	2,000
Wells Street	Chicago River	Clark Street	10,032	20,064
			11,032	22,064

Feet Street ....11,032=2.09 Miles.
Feet of Cable Track.....18,708=3.54 Miles.
Feet of Electric Track.... 3,356= .64 Miles.
Feet of Single Track.....22,064=4.18 Miles.

ESTIMATED COST OR VALUE.

3.54 Miles Cable Track per unit price Est. "A," at	$86,323.05	$305,583.60
.64 Miles Electric Track per valuation Est. 2, at average price	16,388.00	10,488.32
.64 Miles Paving per valuation Est. 2, at average price	8,012.00	5,127.68
.64 Miles Overhead Electric Construction, per unit price Est. "G" at $8,100.03 per mile of D. T.		2,592.00
		$323,791.60

SCHEDULE XI. C.

Grants made prior to July 30, 1883, on Streets now occupied by Tracks of the NORTH DIVISION SYSTEM of the CHICAGO UNION TRACTION COMPANY, where *no time of duration is specified*. Listed as expiring at will of City, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street	Feet of Single Track
Clark Street......	Fullerton Avenue .	Diversey Avenue..	2,904	5,808
Graceland Avenue.	Evanston Avenue..	Clark Street......	3,696	7,392
State Street.......	Center Chi. R.. ..	Michigan Street...	1,000	2,000
Larrabee Street ...	Chicago Avenue...	Lincoln Avenue...	9,265	18,530
Note: Above prior to "99 Year" Act.				
Clark Street......	Center Chi. River.	Randolph Street...	1,000	2,000
Clark Street......	Center Chi. River.	N. Water Street...	600	1,200
Lincoln Avenue...	Fullerton Avenue .	Wrightwood Ave..	1,982	3,964
			20,447	40,894

Feet of Street...........20,447=3.87 Miles.
Feet of Cable Track...... 3,964= .74 Miles.
Feet of Electric Track...36,930=7.00 Miles.
Feet of Single Track.....40,894=7.74 Miles.

ESTIMATED COST OR VALUE.

.74 Miles Cable Track per unit price Est. "A," at....................................	$86,323.05	=$63,879.06
7.00 Miles Electric Track per valuation Est. 2, at average price........................	16,388.00	=114,716.00
7.00 Miles Paving per valuation Est. 2, at average price............................	8,012.00	= 56,084.00
7.00 Miles Overhead Electric Construction, per unit price Est. "G," at $8,100.03 per mile of D. T................................		= 28,350.00
		$263,029.06

SCHEDULE XI. D.

Grants made subsequent to July 30, 1883, on streets now occupied by Tracks of the NORTH DIVISION SYSTEM of the CHICAGO UNION TRACTION COMPANY where *time of duration causes them to expire on or before July 30, 1903*. Listed as expiring July 30, 1903, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street.	Feet of Single Track.
Chicago Avenue...	Chicago River	Milwaukee Avenue	3,168	6,336

Feet of Street............3,168= .60 Miles.
Feet of Electric Track ....6,336=1.20 Miles.

ESTIMATED COST OR VALUE.

1.20 Miles of Electric Track per valuation Est. 2, at average price..........................	$16,388.00=	$19,665.60
1.20 Miles Paving per valuation Est. 2, at average price	8,012.00=	9,614.40
1.20 Miles Overhead Electric Construction per unit price Est. "G" at $8,100.03 per Mile of D. T.	=	4,860.00
		$34,140.00

SCHEDULE XI. E.

Grants made subsequent to July 30, 1883, on streets now occupied by Tracks of the NORTH DIVISION SYSTEM of the CHICAGO UNION TRACTION COMPANY, *where no time of duration is specified.* Listed as expiring at will of City, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street.	Feet of Single Track.
Lincoln Avenue...	Wrightwood Ave..	Belmont Avenue ..	5,636	11,272
Ashland Avenue...	Belmont Avenue ..	Graceland Avenue.	5,328	10,656
Evanston Avenue..	Diversey Avenue..	Graceland Avenue.	7,576	15,152
Graceland Avenue.	Clark Street	Ashland Avenue...	1,716	3,432
Belmont Avenue ..	Lincoln Avenue...	Robey Street......	2,626	5,252
Robey Street......	Belmont Avenue ..	Roscoe Boulevard .	1,329	2,658
Roscoe Boulevard .	Robey Street......	Western Avenue...	2,560	5,120
Sheffield Avenue...	Clark Street	Lincoln Avenue...	5,606	11,212
			32,377	64,754

Feet of Street..........32,377 = 6.13 Miles.
Feet of Electric Track...64,754 = 12.26 Miles.

ESTIMATED COST OR VALUE.

12.26 Miles Electric Track, per valuation Est. 2, average price..........................	$16,388.00 =	$200,916.88
12.26 Miles Paving, per valuation Est. 2, average price..................................	8,012.00 =	98,227.12
12.26 Miles Overhead Electric Construction, per unit price Est. "G" per Mile D. T........	8,100.03 =	49,653.00
		$348,797.00

SCHEDULE XI. F.

No grants found, on streets now occupied by tracks of the NORTH DIVISION SYSTEM of the CHICAGO UNION TRACTION COMPANY, listed as expiring at the will of the City, in the report of March 28, 1898, of the Special Committee of the City Council.

STREET	FROM	TO	Distance on Street.	Feet of Single Track.
Center Street	Lincoln Avenue	Racine Avenue	5,289	5,289
Garfield Avenue	Racine Avenue	Lincoln Avenue	4,627	4,627
Racine Avenue	Center Street	Webster Avenue	1,320	1,320
Webster Avenue	Racine Avenue	Lincoln Avenue	3,958	3,958
			15,194	15,194

Feet of Street..................15,194=2.88 Miles.
Feet of Electric Track..........15,194=2.88 Miles.

ESTIMATED COST OR VALUE.

2.88 Miles Electric Track per valuation Est. 2, average price	$ 16,388.00=	$ 47,197.44
2.88 Miles Paving per valuation Est. 2, average price	8,012.00=	23,074.56
2.88 Miles Overhead Electric Construction, per unit price Est. "G," per Mile D. T.	8,100.03=	11,664.00
		$81,936.00

SCHEDULE XI. A1.

Grants made prior to July 30, 1883, on streets now occupied by Tracks of the WEST DIVISION SYSTEM of the CHICAGO UNION TRACTION COMPANY, where *time of duration causes them to expire on or before July 30, 1903*. Listed as expiring July 30, 1903, in report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street.	Feet of Single Track.
Randolph Street	State Street	Union Park	10,320	20,046
Bryan Place	Randolph Street	Lake Street		
Desplaines Street	Lake Street	Milwaukee Avenue.	1,188	2,376
Milwaukee Avenue	Indiana Street	North Avenue	10,560	21,120
5th Avenue	Randolph Street	Polk Street	4,752	9,504
Polk Street	Canal Street	5th Avenue	1,570	3,140
Van Buren Street	State Street	Ogden Avenue	12,144	24,288
12th Street	Wabash Avenue	Canal Street	3,696	7,392
Note:---Above prior to "99 year" Act.				
Indiana Street	Halsted Street	Western Avenue	10,560	21,120
Milwaukee Avenue.	Clinton Street	Indiana Street	2,376	4,752
Clinton Street	Randolph Street	Milwaukee Avenue	924	1,848
12th Street	Ashland Avenue	Ogden Avenue	3,960	7,920
Randolph Street	Wabash Avenue	State Street	450	900
Madison Street	Homan Avenue	Hamlin Avenue	800	1,600
Blue Island Avenue	Leavitt Street	Western Avenue	1,452	2,904
Milwaukee Avenue.	Clinton Street	Lake Street	792	1,584
Lake Street	Rockwell Street	Homan Avenue	6,336	12,672
Lake Street	State Street	Union Park	9,900	19,800
Lake Street	Wabash Avenue	State Street	400	800
Ogden Avenue	Western Avenue	40th Avenue	11,352	22,704
Leavitt Street	Indiana Street	Chicago Avenue	1,848	3,496
Armitage Avenue	Washtenaw Ave	California Avenue.	1,320	2,640
California Avenue.	North Avenue	Armitage Avenue	2,640	5,280
Armitage Avenue	Milwaukee Avenue	Washtenaw Avenue	792	1,584
Milwaukee Avenue	North Avenue	Armitage Avenue	4,224	8,448
			104,356	207,918

Feet of Street.........104,356=19.76 Miles.
Feet of Cable, type "A" 29,709= 5.62 Miles.
Feet of Cable, type "B" 7,826= 1.48 Miles.
Feet of Electric Track..169,164=32.05 Miles.
Feet of Horse Track... 1,219= .23 Miles.

Feet of Single Track....207,918=39.38 Miles.

SCHEDULE XI. A1.—Continued.

ESTIMATED COST OR VALUE.

5.62 Miles Cable Track of type given in unit price, Est. "A," per valuation Est. 2.....	$86,323.05=	$485,135.54
1.48 Miles Cable Track of type given in unit price Est. "B," per valuation Est. 2....	74,623.17=	110,442.29
32.05 Miles Electric Track, per valuation Est. 2, average price..........................	16,388.00=	525,235.40
32.05 Miles of Paving, per valuation Est. 2, average price..........................	8,012.00=	256,784.60
32.05 Miles Overhead Electric Construction, unit price Est. G, Mile D. T.............	8,100.03=	129,762.00
.23 Miles Horse Track, per valuation Est. 2, average price..........................	16,388.00=	3,769.24
.23 Miles Paving, per valuation Est. 2, average price.............................	8,012.00=	1,842.76
		$1,512,971.83

SCHEDULE XI. B1.

Grants made prior to July 30, 1883, on Streets now occupied by Tracks of the **WEST DIVISION SYSTEM** of the **CHICAGO UNION TRACTION COMPANY**, in which the provisions appeared, ***for 25 years, and thereafter, until City purchase plant and equipment***, or ***for 20 years and until Council order for private purchase***. Listed as expiring July 30, 1903, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street.	Feet of Single Track.
Madison Street	State Street	Western Avenue	15,840	31,680
Note: Above prior to "99 year" Act.				
Blue Island Avenue	22nd Street	Leavitt Street	4,488	8,976
North Avenue	Milwaukee Avenue	California Avenue	5,280	10,560
Blue Island Avenue	Rebecca Street	22nd Street	4,224	8,448
Ogden Avenue	Madison Street	Western Avenue	8,184	16,368
Halsted Street	Harrison Street	South Branch	8,712	17,424
O'Neil Street	Halsted Street	Car House	517	1,034
Harrison Street	Clinton Street	Canal Street	528	1,056
Canal Street	Harrison Street	Canalport Avenue	5,923	11,846
Canalport Avenue	Canal Street	So. Halsted Street	2,446	4,892
12th Street	Canal Street	Ashland Avenue	7,392	14,784
Madison Street	Rockwell Street	Central Park	5,848	11,696
Western Avenue	Madison Street	Van Buren Street	1,848	3,696
Chicago Avenue	Milwaukee Avenue	Leavitt Street	2,904	5,808
			74,134	148,268

Feet of Street	74,134	14.04 Miles.
Feet of Cable Track of Type given in unit price estimate "A"	36,968	7.00 Miles.
Feet of Cable Track of Type given in unit price estimate "B"	35,882	6.80 Miles.
Feet of Electric Track	75,418	14.28 Miles.
Feet of Single Track	148,268	28.08 Miles.

SCHEDULE XI. B1.—Continued.

ESTIMATED COST OR VALUE.

7.00	Miles Cable Track of Type given in unit price estimate "A," per Est. 2..	$86,323.05	$ 604,261.35
6.80	Miles Cable Track of Type given in unit price estimate "B," per Est. 4...	74,623.17	507,437.56
14.28	Miles Electric Track, per valuation Est. 2, avg. price....................	16,388.00	234,020.64
14.28	Miles Paving per valuation Est. 2, avg. price..........................	8,012.00	114,411.36
14.28	Miles Overhead Electric Construction, per unit price, Est. "G," at $8,100.03 per Mile of D. T..................		57,834.00
			$1,517,964.91

SCHEDULE XI. C1.

Grants made prior to July 30, 1882, on Streets now occupied by Tracks of the WEST DIVISION SYSTEM of the CHICAGO UNION TRACTION COMPANY where *no time of duration is specified.* Listed as expiring at will of City, in report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street.	Feet of Single Track.
Lake Street	Union Park	Western Ave	5,808	11,616
Desplaines Street	Lake Street	Randolph Street	400	800
Halsted Street	Lake Street	Blue Island Ave	4,224	8,448
Blue Island Ave	Halsted Street	Rebecca Street	4,884	9,768
Halsted Street	Lake Street	Milwaukee Ave	2,112	4,224
Clinton Street	Madison Street	Randolph Street	822	1,644
Clinton Street	Harrison Street	Madison, D. T.	2,640	5,280
Clinton Street	Harrison Street	12th Street S. T.	2,640	2,640
Meagher Street	Canal Street	Jefferson Street	792	1,584
Jefferson Street	Meagher Street	12th Street, D. T.	1,802	3,604
Jefferson Street	12th Street	Van Buren St. S. T.	3,432	3,432
Note:—Above prior to "99 year" Act.				
Van Buren Street	Ogden Ave	Western Ave	3,696	7,392
Madison Street	Western Ave	Rockwell Street	528	1,056
			33,780	61,488

Feet of Street..........33,780 = 6.40 Miles.

Feet of Cable Track of Type given in unit price estimate "A".. 1,856 = .35 Miles.

Feet of Cable Track of Type given in unit price estimate "B"..11,510 = 2.18 Miles.

Feet of Electric Track..36,926 7.00 Miles.

Feet of Horse Track....11,196 2.12 Miles.

Feet of Single Track....61,488 11.65 Miles.

SCHEDULE XI. C1.—Continued.

ESTIMATED COST OR VALUE.

.35 Miles Cable Track of Type given in unit price Est. "A," per Val. Est. 2	$ 86,323.05	$ 30,213.07
2.18 Miles Cable Track, of Type given in unit price Est. "B," per Val. Est. 2	74,623.17	162,678.51
7.00 Miles Electric Track, per valuation Est. 2, average price	16,388.00	114,716.00
7.00 Miles Paving, per valuation Est. 2, average price	8,012.00	56,084.00
7.00 Miles Overhead Electric Construction, per per unit price Est. G, per Mile of D. T.	8,100.03	28,350.00
2.12 Miles Horse Track, per valuation Est. 2, at average price	16,388.00	34,742.56
2.12 Miles Paving, per valuation Est. 2, at average price	8,012.00	16,985.44
		$443,769.58

SCHEDULE XI. E1.

Grants made subsequent to July 30, 1883, on streets now occupied by Tracks of the WEST DIVISION SYSTEM of the CHICAGO UNION TRACTION COMPANY, where *no time of duration is specified.* Listed as expiring at will of City, in Report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street.	Feet of Single Track.
5th Avenue	Polk Street	12th Street	1,469	2,938
Chicago Avenue	Leavitt Street	California Avenue	3,168	6,336
California Avenue	Chicago Avenue	Division Street	2,640	5,280
12th Street	Ogden Avenue	Western Avenue	660	1,320
			7,937	15,874

Feet of Street............ 7,937 = 1.50 Miles.
Feet of Electric Track...15,874 = 3.00 Miles.

ESTIMATED COST OR VALUE.

3.00 Miles Electric Track per valuation Est. 2, at average price	$16,388	$49,164.00
3.00 Miles Paving, per valuation Est. 2, at average price	8,012	24,036.00
3.00 Miles Overhead Electric Construction, per unit price Est. "G," $8,100.03 per mile of D. T.		24,300.00
		$97,500.00

SCHEDULE XI. F1.

No grants found on streets now occupied by tracks of the WEST DIVISION SYSTEM of the CHICAGO UNION TRACTION COMPANY. Listed as expiring at will of the City, in report of March 28, 1898, of Special Committee of the City Council.

STREET	FROM	TO	Distance on Street.	Feet of Single Track.
Lake Street	Western Avenue	Rockwell Street	528	1,056
Madison Street	Hamlin Avenue	Crawford Avenue	3,696	7,392
Western Avenue	Lake Street	Madison Street	1,188	2,376
			5,412	10,824

Feet of Street	5,412 =	1.02 Miles.
Feet of Cable Track of Type given in unit price Est. "A"	7,392 =	1.40 Miles.
Feet of Electric Track	3,432 =	.65 Miles.
Feet of Single Track	10,824 =	2.05 Miles.

ESTIMATED COST OR VALUE.

1.40 Miles Cable Track of Type given in unit price estimate "A," per valuation Est. 2, at	$ 86,323.05	$120,852.27
.65 Miles Electric Track, average price per valuation Est. 2 at	16,388.00	10,652.20
.65 Miles Paving, average price per valuation Est. 2 at	8,012.00	5,207.80
.65 Miles Overhead Construction (Electric), per unit price, Est. "G," per Mile of D. T., at	8,100.03	5,265.00
		$141,977.27

SUMMARY OF SCHEDULES.

CHICAGO CITY RAILWAY COMPANY.

SCHEDULE	Miles of Street	Miles S. T. Cable	Miles S. T. Electric	Miles S. T. Total	Cost or Value Amount
10 "A".......	6.15	3.00	6.28=	9.28	$ 455,489.28
10 "B".......	7.75	9.00	6.25=	15.25	972,448.20
10 "C".......	9.46	6.64	8.79=	15.43	848,210.02
10 "D".......	8.73	.23	17.02=	17.25	552,461.16
10 "E"........	16.11	....	30.42=	30.42	951,983.06
10 "F".......	12.32	4.45	18.50=	22.95	963,058.07
Totals....	60.52	23.32	87 26	110.58	$4,743,599.79
Total tracks Constructed per Appendix G, Val. Est. 1..........	110.00	34.75	Horse 1.87 183.38=	220.00	8,789,042.68
Difference..	49.48	11.43	96.12= Horse 1.87	109.42	$4,045,442.84
Percentage expiring per Committee Report......	55.02 %	67.10 %	47.10%	50.26 %	53.97 %

CHICAGO UNION TRACTION COMPANY.

NORTH DIVISION SYSTEM.

SCHEDULE	Miles of Street	Miles S. T. Cable	Miles S. T. Electric	Miles S. T. Total	Cost or Value Amount
11 A	10.69	11.10	9.29	20.39	$1,222,445.85
11 B	2.09	3.54	.64	4.18	323,791.60
11 C	3.87	.74	7.00	7.74	263,029.06
11 D	.60	.....	1.20	1.20	34,140.00
11 E	6.13	.....	12.26	12.26	348,797.00
11 F	2.88	.....	2.88	2.88	81,936.00
	26.26	15.38	33.27	48.65	$2,274,139.51

WEST DIVISION SYSTEM.

SCHEDULE	Miles of Street	Miles S. T. Cable	Miles S. T. Electric	Miles S. T. Horse	Miles S. T. Total	Cost or Value Amount
11 A 1	19.76	7.10	32.05	.23	39.38	$1,512,971.83
11 B 1	14.04	13.80	14.28	.....	28.08	1,517,964.91
11 C 1	6.40	2.53	7.00	2.12	11.65	443,769.58
11 D 1	....	.....	.....	.....	.....	....
11 E 1	1.50	.....	3.00	.....	3.00	97,500.00
11 F 1	1.02	1.40	.65	.....	2.05	141,977.27
	42.72	24.83	56.98	2.35	84.16	$3,714,183.59

CHICAGO UNION TRACTION COMPANY.

NORTH AND WEST DIVISIONS COMBINED.

SCHEDULE	Miles of Street	Miles S. T. Cable	Miles S. T. Electric	Miles S. T.Horse	Miles S. T. Total	Cost or Value Amount
11 A and A 1...	30.45	18.20	41.34	.23=	59.77	$2,735,417.68
11 B and B 1...	16.13	17.34	14.92	....=	32.26	1,841,756.51
11 C and C 1....	10.27	3.27	14.00	2.12=	19.39	706,798.64
11 D and D 1...	.60	.....	1.20	....=	1.20	34,140.00
11 E and E 1....	7.68	.....	15.26	....=	15.26	446,297.00
11 F and F 1...	3.90	1.40	3.53	....=	4.93	223,913.27
	68.98	40.21	90.25	2.35=	132.81	$5,988,323.10
Total Tracks Constructed per appendix H and Val. Est. 2...........	156.62	47.60	251.11	7.12=	305.83	$11,294,882.05
Difference .	87.64	7.39	160.86	4.77=	173.02	$ 5,306,558.95
Percentage expiring per Committee Report.........	44.04%	84.47%	35.94%	33%	43.42%	53%

CHICAGO CITY RAILWAY COMPANY AND CHICAGO UNION TRACTION COMPANY COMBINED.

SCHEDULE	Miles of Street	Miles S.T. Cable	Miles S.T. Electric	Miles S T. Horse	Miles S.T Total	Cost or Value Amount
10 A and 11 A and 11 A 1........	36.60	21.20	47.62	.23=	69.05	$ 3,190,906.96
10 B and 11 B and 11 B 1........	23.88	26.34	21.17	...=	47.51	2,814,204.71
10 C and 11 C and 11 C 1........	19.73	9.91	22.79	2.12=	34.82	1,555,008.66
10 D and 11 D and 11 D 1........	9.33	.23	18.22	....=	18.45	586,601.16
10 E and 11 E and 11 E 1........	23.74	.....	45.68	....=	45.68	1,398,230.06
10 F and 11 F and 11 F 1........	16.22	5.85	22.03	....=	27.88	1,186,971.34
	129.50	63.53	177.51	2.35=	243.39	$10,731,922.89
Total Tracks Constructed per App. G & H, Val. Est. 1 and 2.............	266.62	82.35	434.49	9.99=	525.83	$20,083,924.68
Difference...	137.12	18.82	256.98	6.64=	282.44	9,352,001.79
Percentage expiring per Committee Report.	48.57 %	77.14 %	40.85 %	26.14 %=	46.29 %	53.43 %

PART VI.—CHAPTER IX.

COST ESTIMATES.

COST ESTIMATE NO. 1.

Estimate of Cost to Produce the Property Necessary for the Operation of a System of Surface and Subway Transportation as Outlined in Part V of this Report, but not Including Cost of Subways.

TRACKS, PAVING AND ELECTRIC TRANSMISSION.

745.81	miles of single track located on streets as given in Appendix J, consisting of:	
354.84	miles of single track paved with dressed granite per Unit Price Estimate I, at $42,365.01	$15,032,800.15
354.84	miles of single track paved with vitrified brick, per Unit Price Estimate I, at $36,615.01	12,992,470.15
15.06	miles of single track in subways not paved as per Unit Price Est. I, at $23,965.01.	360,913.05
21.07	miles of single track, underground conduit type, paved with asphalt, as per Unit Price Estimate J, at $94,181.52	1,984,404.62
745.81	miles of single track	$30,370,587.97
	Overhead trolley electrical construction on 724.74 miles of single track at $8,100.03 per mile of double track, including feeder wire, per Unit Price Estimate G	2,935,207.87
		$33,305,795.84

COST ESTIMATE NO. 1.—Continued.

POWER PRODUCTION.

Power plant and sub-stations, including buildings and machinery for the operation of 2,000 cars at 50 k. w. per car: Power house, 100,000 k. w. at $110; sub-stations 200,000 k. w., with batteries $50; without batteries, $30; average, $40	$19,000,000.00

ROLLING STOCK AND OTHER EQUIPMENT.

2,000 double-truck cars equipped at $6,000 per car	12,000,000.00
Other rolling stock, snow plows and sweepers, 250 units, at $4,000.00	1,000,000.00
Other equipment, wagons, tools, etc.	169,204.16

REAL ESTATE.

Power house site, centrally located	750,000.00
Sub-station sites, 15 at $5,000.00	75,000.00
Car shop site	100,000.00
Car barn sites, 20 at $20,000.00	400,000.00
For centrally located offices	300,000.00

BUILDINGS OTHER THAN POWER HOUSE AND SUB-STATIONS.

Car shops and machinery	300,000.00
Car barns, 20 at $100,000.00	2,000,000.00
Office building, furniture and fixtures	400,000.00
	$69,800,000.00

COST ESTIMATE NO. 2.

Estimate of Cost to Produce Proposed Subway System No. 1, as Shown on Map 11, Sectional Views of Which are Shown by Plates 1 to 8 Inclusive, and as Described in Part VI. of this Report.

DOUBLE-TRACK SUBWAY IN OPEN CUTTING.

Distances—

In 80-ft.	streets,	17,120	lineal	feet.
" 80-ft.	"	2,125	"	" stations.
" 66-ft.	"	1,280	"	"
Total double-track open cut.....		20,525	lineal	feet.

SINGLE TRACK SUBWAY IN OPEN CUTTING.

Subway proper	13,980	lineal feet.
Stations, single track	1,375	lineal feet.
Special stations, single track	625	lineal feet.
Total single track open cut	15,980	lineal feet.

TUNNEL APPROACHES TO RIVER TUNNELS.

Single Track—		
Van Buren Street tunnel	1,100	feet.
Washington Street tunnel	1,150	feet.
Total single track approach	2,250	feet.
Double Track—		
Van Buren Street tunnel	300	feet.
Total double track approach	300	feet.

COST ESTIMATE NO. 2.—Continued.

NEW TUNNELS.

Double track tunnel proper	1,950 feet	Clark Street.
Double track tunnel proper	1,360 feet	Dearborn Street.
Total double track tunnel	3,310 feet.	
Single Track tunnel approach	400 feet	Clark Street.
Single Track tunnel approach	1,350 feet	Dearborn Street.
Total single track tunnel	1,750 feet.	
Double track open approach	600 feet	in Clark St., N. Side.
Double track open approach	600 feet	in Dearborn St., N. Side.
Total double track tunnel approach	1,200 feet	

EXISTING TUNNELS AFTER CHANGES HAVE BEEN MADE TO ADAPT THEM TO THE PROPOSED SUBWAY SYSTEM.

Van Buren Street	1,100 feet.
Washington Street	1,085 feet.
La Salle Street	2,250 feet.
Total	4,435 feet.

SUMMARY.

Double track subway, open cut	20,525	feet.
Single track subway, open cut	15,980	"
Single track tunnel approaches to present river tunnels	2,250	"
Double track tunnel approaches to present river tunnels	300	"

NEW TUNNELS UNDER RIVER.

Clark and Dearborn Streets tunnel proper	3,310	"
Single track tunnel approach	1,750	"
Double track open approach	1,200	"
Remodeled existing tunnels	4,435	"
Total lineal feet of subway and tunnels	49,750	"

This total is equal to 9.42 miles of subways and tunnels, of which 5.64 miles is double track structure and 3.78 miles is single track, providing for 15.06 miles of single track railway.

COST ESTIMATE NO. 2.—Continued.

ESTIMATED COST OF SUBWAYS AND TUNNELS.

PLAN NUMBER 1.

Excavation	$1,900,000.00
Timbering	1,200,000.00
Concrete	3,720,000.00
Water-proofing	226,000.00
Structural steel	772,380.00
Rearranging water and gas pipes	615,000.00
Rearranging sewers	200,000.00
New trunk line sewer, low level	100,000.00
Rearranging pneumatic and electrical underground work	450,000.00
Sidewalks, paving, gratings, manhole covers, etc.	500,000.00
Stations	550,000.00
Temporary maintenance of traffic, care of abutting buildings, etc.	1,200,000.00
	$11,433,380.00
Plus for engineering, supervision and administration	1,143,338.00
Total for subways	$12,576,718.00
Two new tunnels at Clark and Dearborn Streets	1,600,000.00
Lowering existing tunnels	1,500,000.00
Total	$15,676,718.00
Say	*16,000,000.00

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*These figures do not include damages that might be shown to property abutting subway approaches, but as the figures are liberal they might possibly cover any such damages. The amount of these damages is a question for real estate experts, and can only be determined after exact locations for subway approaches are fixed.

COST ESTIMATE NO. 3.

Estimate of Cost to Produce Subway System No. 2, as Shown on Map No. 5, Sectional Views of Which are Shown by Plates 1 to 9 Inclusive, as Described in Part VI, Pages 148 to 153 of this Report.

High Level—			
Double tracked subway, open cut	20,525	lineal	feet.
Single track, open cut	15,980	“	“
Single track tunnel approaches to present river tunnels	2,250	“	“
Double track tunnel approaches to present river tunnels	300	“	“
Low Level—			
Double track tunnel	6,800	“	“
Single track tunnel	12,400	“	“
New tunnels under river, Clark, Dearborn and Adams Streets	4,965	“	“
Single track tunnel approach	1,750	“	“
Double track, open approach	1,200	“	“
Remodeling existing tunnels	4,435	“	“
	70,605	lineal	feet.

Estimated Cost of High and Low Level Subway System, Plan No. 2—

Excavation	$ 2,533,333
Timbering	1,600,000
Concrete	4,960,000
Water-proofing	301,333
Structural steel	1,029,840
Rearranging water and gas pipes	615,000
Rearranging sewers	200,000
New trunk line sewer	100,000
Rearranging pneumatic and electrical underground work	450,000

COST ESTIMATE NO. 3.—Continued.

Sidewalks, paving, gratings, manhole covers, etc.	500,000
Stations	733,333
Temporary maintenance of traffic, care of abutting buildings, etc.	1,333,333
	$14,356,172
Plus for engineering, supervision and administration.	1,435,617
Total for subways	$15,791,789
Three new tunnels at Clark, Dearborn, Adams Streets	2,400,000
Lowering existing tunnels	1,500,000
Total	$19,691,789
Say	*20,000,000

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*See footnote on page 235.

APPENDICES.

APPENDIX A.

Present Routes, Length of Round Trip, Time and Maximum Number of Cars Operated.

CHICAGO UNION TRACTION COMPANY.

	Miles Round Trip.	Time Round Trip Mts.,	Maximum Number of Cars Operated
MADISON STREET CABLE.			
From Madison and Fortieth street loop house; east on Madison street to Jefferson street; north on Jefferson to Washington street; east through Washington street tunnel to Fifth avenue; south on Fifth avenue to Madison street; east on Madison street to State street; north on State street to Washington street; returning west on Washington street through Washington street tunnel to Jefferson street; south on Jefferson street to Madison street; and west on Madison street to loop house.	10.35	75	45 grip 90 trail
MILWAUKEE AVENUE CABLE.			
From Milwaukee and Armitage avenue station; south on Milwaukee avenue to Desplaines street; south on Desplaines to Washington street; east on Washington street through Washington street tunnel to Fifth avenue; south on Fifth avenue to Madison street; east on Madison to State street; north on State to Washington street; returning west on Washington street through Washington street tunnel to Desplaines street; north on Desplaines street to Milwaukee avenue; north on Milwaukee avenue to Armitage avenue.	8.94	74	28 grip 56 trail

	Miles Round Trip.	Time Round Trip, Minutes.	Maximum Number of Cars Operated.
BLUE ISLAND AVENUE CABLE. From Blue Island avenue station northeast on Blue Island avenue to Halsted street; north on Halsted to Van Buren street; east on Van Buren to Clinton street; north on Clinton, turning east through Van Buren street tunnel to Franklin and Van Buren streets; east on Van Buren street to Dearborn street; north on Dearborn to Adams street; west on Adams to Franklin street; south on Franklin to Van Buren street tunnel; west through tunnel to Clinton and Van Buren streets; west on Van Buren to Halsted street; south on Halsted to Blue Island avenue, and southwest on Blue Island avenue to Leavitt street.	8.15	68	14 grip 28 trail
HALSTED STREET CABLE. From Halsted street station, north on Halsted street to Van Buren street; east on Van Buren to Clinton street; east through Van Buren street tunnel to Franklin and Van Buren streets; east on Van Buren to Dearborn street; north on Dearborn to Adams street; west on Adams to Franklin street; west through Van Buren street tunnel, and return same route.	5.83	58	13 grip 26 trail
CLARK LIMITS CABLE. From Limits station, south on Clark street to Illinois street; west on Illinois to La Salle street; south on La Salle street through La Salle street tunnel to Monroe street; east on Monroe street to Dearborn street; north on Dearborn to Randolph street; west on Randolph to La Salle street; north on La Salle street through tunnel to Illinois street; east on Illinois street to Clark street, and north on Clark street to Limits station.	7.78	62	21 grip 42 trail
WELLS LIMITS CABLE. From Limits station, south on Clark street to Wells street; south on Wells street to Illinois street; east on Illinois street to La Salle street; south on La Salle through La Salle Street Tunnel to Monroe street; east on Monroe street to Dearborn street; north on Dearborn to Randolph street; west on Randolph to La Salle street; north on La Salle street through tunnel to Illinois street; west on Illinois street to Wells street; north on Wells to Clark street and north on Clark street to Limits station.	7.71	63	8 grip 16 trail

	Miles Round Trip.	Time Round Trip, Minutes.	Maximum Number of Cars. Operated
CLARK LINCOLN CABLE. From Lincoln avenue station; south on Lincoln avenue to Center street; east on Center to Clark street; south on Clark street to Illinois street; west on Illinois street to La Salle street; south on La Salle street through La Salle street tunnel to Monroe street; east on Monroe street to Dearborn street, north on Dearborn to Randolph street; west on Randolph street to La Salle street; north on La Salle street through tunnel to Illinois street; east on Illinois to Clark street; north on Clark to Center street; west on Center to Lincoln avenue; north on Lincoln avenue to station.	8.24	66	22 grip 44 trail
WELLS LINCOLN CABLE. From Lincoln avenue station; south on Lincoln avenue to Center street; east on Center to Clark street; south on Clark street to Wells street; south on Wells street to Illinois street; east on Illinois street to La Salle street; south on La Salle through La Salle street tunnel to Monroe street; east on Monroe street to Dearborn street; north on Dearborn street to Randolph street; west on Randolph to La Salle street; north on La Salle street through tunnel to Illinois street; west on Illinois to Wells street; north on Wells street to Clark street; north on Clark to Center street; west on Center street to Lincoln avenue and north on Lincoln avenue to station.	8.17	63	8 grip 16 trail
CLYBOURN AVENUE CABLE. From Clybourn avenue station; south on Clybourn avenue to Division street; east on Division street to Wells street; south on Wells street to Illinois street; east on Illinois street to La Salle street; south on La Salle through tunnel to Monroe street; east on Monroe to Dearborn street; north on Dearborn to Randolph street; west on Randolph to La Salle street; north on La Salle street through tunnel to Illinois street; west on Illinois to Wells street; north on Wells street to Division street; west on Division to Clybourn avenue, northwest on Clybourn avenue to station.	8.15	65	11 grip 22 trail
			170 grip 340 trail

	Miles Round Trip.	Time Round Trip, Minutes.	Maximum Number of Cars Operated.
MILWAUKEE AVENUE EXTENSION. From Milwaukee avenue station, east of Armitage avenue, to Milwaukee avenue; northwest on Milwaukee avenue to Belmont avenue, and return southeast on Milwaukee avenue to Armitage.	4.70	30	4 motors
ARMITAGE AVENUE LINE. From Milwaukee avenue station, west on Armitage avenue to 44th street, returning same route.	4.76	30	8 motors
DESPLAINES AND CLINTON. From North avenue and 46th street, east on North avenue to Holt street, south on Holt to Blackhawk street; east on Blackhawk to Noble street; south on Noble street to Milwaukee avenue; south on Milwaukee to Desplaines street; south on Desplaines to Harrison street; east on Harrison to Clinton street; north on Clinton to Milwaukee avenue; north on Milwaukee avenue to Noble street; north on Noble to Blackhawk street; west on Blackhawk to Holt street; north on Holt street to North avenue, and west on North avenue to 46th street.	14.24	100	8 motors
18TH AND 26TH STREETS. From 31st street and 41st avenue, east on 31st street to 40th avenue, north on 40th avenue to 26th street; east on 26th street to Blue Island avenue; northeast on Blue Island avenue to Leavitt street; north on Leavitt to 18th street; east on 18th street to State street, returning same route.	9.56	94	14 motors 5 trail
CANAL AND 21ST STREETS. From 21st street and Douglas boulevard, east on 21st street to Halsted street; north on Halsted to Canalport avenue; east on Canalport avenue to Canal street; north on Canal street to Harrison street; east on Harrison to Clinton street; north on Clinton to Madison street; east on Madison to Fifth avenue; north on Fifth avenue to Kinzie street, and return same route.	11.61	102	16 motors
HALSTED, O'NEIL TO VAN BUREN. From Halsted and O'Neil streets, north on Halsted street to Van Buren street, returning same route.	3.70	40	2 motors

OGDEN AVENUE LINE. From station, northeast on Ogden avenue to Randolph street; east on Randolph street to Clinton street; north on Clinton to Lake street; east on Lake to Dearborn street; south on Dearborn to Randolph street; east on Randolph to State street; north on State to Lake street, returning west on Lake street to Clinton street; south on Clinton street to Randolph street; west on Randolph to Ogden avenue; southwest on Ogden avenue.	11.88	90	29 motors 23 trail
OGDEN TO MADISON. From station, northeast on Ogden avenue to Madison street, returning same route.	7.42	48	cars included above
TWELFTH STREET LINE. From 12th street and 40th avenue, east on 12th street to Fifth avenue, north on Fifth avenue to Van Buren street; east on Van Buren to State street, returning same route.	11.41	82	52 motors
12TH, 40TH TO WABASH. From 12th street and 40th avenue, east on 12th street to Wabash avenue, returning same route.	10.21	70	cars included above
FOURTEENTH STREET LINE. From Robey and Fourteenth streets, east on 14th street to Canal street; north on Canal to 12th street, east on 12th to Wabash avenue, returning same route.	5.66	44	4 motors
VAN BUREN STREET LINE. From Kedzie avenue and Van Buren street, east on Van Buren to State street, returning same route.	8.00	63	32 motors
HARRISON STREET VIA CLINTON. From Kedzie avenue and Harrison street, east on Harrison street to Clinton street; north on Clinton to Adams street; east on Adams to State street, returning same route.	8.69	70	14 motors
HARRISON STREET VIA CENTER. From Kedzie avenue and Harrison street, east on Center avenue; north on Center avenue to Adams street; east on Adams to State street; returning same route.	8.67	70	14 motors

	Miles Round Trip	Time Round Trip, Minutes.	Maximum Number of Cars Operated.
KEDZIE AVENUE LINE. From Kedzie avenue and 12th street, north on Kedzie avenue to Chicago avenue; east on Chicago avenue to California avenue; north on California avenue to Belmont avenue; returning same route.	11.03	75	15 motors
COLORADO AVENUE LINE. From Hamlin and Colorado avenues, northeast on Colorado avenue to Madison street and California avenue, and return same route.	2.63	15	2 motors
ADAMS TO MICHIGAN LINE. From State and Adams streets, east on Adams street to Michigan avenue; north on Michigan to Washington street, return same route	.66	10	1 horse
NORTH WESTERN AVENUE LINE. From Elston and Western avenues, south on Western avenue to Fourteenth street, returning same route.	9.81	75	16 motors 16 trail
SOUTH WESTERN AVENUE LINE. From Fourteenth street and Western avenue, south on Western avenue to 26th street, returning same route.	2.61	20	2 motors
GRAND AVENUE TO 40TH STREET LINE. From North avenue and 40th street, south on 40th street to Grand avenue; east on Grand avenue to Halsted street; south on Halsted to Lake street; east on Lake to Dearborn street; south on Dearborn to Randolph street; east on Randolph to State street; north on State to Lake street; west on Lake to Halsted street; north on Halsted to Grand avenue, and west on Grand avenue to 40th street, and north on 40th street to North avenue.	12.21	85	12 motors 9 trail
GRAND AVENUE AND INDIANA TO STATE. From Western avenue and Grand avenue, east on Grand avenue to State street; south on State to Kinzie street; west on Kinzie to Dearborn street; south on Dearborn to Lake street; east on Lake to State street; south on State street to Randolph street; west on Randolph to Dearborn street, returning same route.	7.33	64	4 motors

	Miles Round Trip.	Time Round Trip, Minutes.	Maximum Number of Cars Operated.
ROBEY STREET LINE.			
From Fullerton avenue and Robey street, south on Robey to Fourteenth street, returning same route.	8.52	70	14 motors
TAYLOR STREET LINE.			
From Western avenue and Taylor street, east on Taylor to Canal street; north on Canal to Harrison street; west on Harrison to Clinton street; north on Clinton to Madison street; east on Madison to Fifth avenue; north on Fifth avenue to Kinzie street, returning same route.	8.44	75	16 motors
LAKE STREET LINE.			
From 48th and Lake streets, east on Lake to Dearborn street, south on Dearborn to Randolph street; east on Randolph to State street; north on State to Lake street, returning west on Lake to 48th street.	12.40	94	9 motors
DIVISION STREET LINE.			
From Division street and California avenue, east on Division street to Milwaukee avenue; south on Milwaukee avenue to Desplaines street; south on Desplaines to Lake street; east on Lake to Dearborn street; south on Dearborn street to Randolph street; east on Randolph to State street; north on State to Lake street; returning west on Lake street to Desplaines street; north on Desplaines to Milwaukee avenue; north on Milwaukee to Division street; west on Division street to California avenue.	8.64	75	15 motors 15 trail
CHICAGO AVENUE LINE.			
From Chicago avenue and 40th street, east on Chicago avenue to Milwaukee avenue; south on Milwaukee avenue to Lake street; east on Lake street to Dearborn street; south on Dearborn to Randolph street; east on Randolph to State street; north on State to Lake street; west on Lake street, returning same route.	10.93	80	22 motors
ASHLAND VIA PAULINA LINE.			
From Wood street and Clybourn place, east on Clybourn place to Ashland avenue; south on Ashland avenue to Lake street; west on Lake street to Paulina street; south on Paulina street to Twelfth street; east on Twelfth street			

	Miles Round Trip	Time Round Trip, Minutes.	Maximum Number of Cars Operated.
ASHLAND VIA PAULINA LINE—Continued. to Ashland avenue, south on Ashland avenue to 22nd street, returning same route.	9.66	80	18 motors 18 trail
SANGAMON STREET AND CENTER AVENUE. From Erie street and Ashland avenue, east on Erie street to Center avenue; south on Center avenue to Austin avenue; east on Austin avenue to Sangamon street; south on Sangamon street to Adams street; west on Adams to Center avenue; south on Center avenue to 21st street, returning same route.	7.87	58	11 motors 11 trail
LINCOLN AVENUE TO GRACELAND. From Lincoln avenue station, north on Lincoln avenue to Graceland avenue, returning same route.	4.60	30	5 motors
LARRABEE STREET LINE. From Belden avenue and Racine avenue, south on Racine avenue to Webster avenue; east on Webster avenue to Larrabee street; south on Larrabee to Chicago avenue; east on Chicago avenue to Orleans street; south on Orleans to Kinzie street; east on Kinzie to Clark street; south on Clark to Washington street, returning north on Clark street to Kinzie street; west on Kinzie to Orleans street; north on Orleans to Chicago avenue; west on Chicago avenue to Larrabee street; north on Larrabee to Lincoln avenue; northwest on Lincoln avenue to Fullerton avenue; west on Fullerton to Racine avenue; south on Racine to Belden avenue.	8.40	66	13 motors
SEDGWICK STREET LINE. From Racine avenue and Center street, east on Center street to Sedgwick street; south on Sedgwick to Division street; west on Division street to Sedgwick street; south on Sedgwick to Chicago avenue; east on Chicago avenue to Orleans street; south on Orleans to Kinzie street; east on Kinzie to Clark street; south on Clark to Washington street, returning north on Clark street to Kinzie street; west on Kinzie to Orleans street; north on Orleans to Division street; west on Division to Sedgwick street; north on Sedgwick to Lincoln avenue; northwest on Lincoln avenue to Garfield avenue; west on Garfield to Racine avenue; south on Racine avenue to Center street.	7.79	63	12 motors

	Miles Round Trip.	Time Round Trip, Minutes.	Maximum Number of Cars Operated.
CHICAGO AVENUE LINE.			
From Chicago avenue and Clark street, west on Chicago avenue to California avenue; north on California avenue to Division street, and return same route.	7.80	57	12 motors
FULLERTON AVENUE LINE.			
From Fullerton avenue and Halsted street, west on Fullerton to Milwaukee avenue, and return same route.	5.26	36	4 motors
DIVISION STREET LINE.			
From Clybourn avenue and Division street, west on Division to California avenue, returning same route.	5.85	30	6 motors
NORTH AVENUE LINE.			
From North avenue and Clark street, west on North avenue to 46th street, returning same route.	11.24	72	21 motors
STATE STREET LINE.			
From Clark and Division streets, east on Division to State street; south on State to Kinzie street; west on Kinzie to Dearborn street; south on Dearborn to Lake street; east on Lake to State street; south on State to Randolph street; west on Randolph to Dearborn street, returning same route.	3.30	30	11 motors
DEARBORN STREET LINE.			
From Northwestern Depot at Kinzie and Wells streets; east on Kinzie to Dearborn street; south on Dearborn to Polk street; returning same route.	3.04	42	6 motors
CLYBOURN TO BELMONT.			
From Clybourn avenue and Cooper street, northwest on Clybourn avenue to Belmont avenue, returning same route.	2.91	20	2 motors
CLARK TO DEVON AVENUE LINE.			
From Limits station north on Clark street to Devon avenue, returning same route.	10.08	60	11 motors
EVANSTON AVENUE LINE.			
From Limits station north on Clark street to Evanston avenue; north on Evanston avenue to Halsted street; north on Halsted street to Graceland, returning same route.	3.68	27	4 motors

	Miles Round Trip.	Time Round Trip, Minutes.	Maximum Number of Cars Operated.
HALSTED AND 21ST STREET LINE.			
From Halsted and Clark streets, south on Halsted to 21st street, returning same route.	13.53	100	36 motors
ASHLAND AVENUE LINE.			
From Lincoln and Wrightwood avenues, north on Lincoln avenue to Ashland avenue; north on Ashland to Graceland avenue, returning same route.	4.11	27	4 motors
BELMONT AND ROSCOE LINE.			
From Lincoln and Wrightwood avenues, north on Lincoln avenue to Belmont avenue; west on Belmont avenue to Robey street; north on Robey street to Roscoe boulevard; west on Roscoe boulevard to Western avenue, returning same route.	4.59	30	6 motors
SHEFFIELD AVENUE LINE.			
From Lincoln and Wrightwood avenues, north on Sheffield avenue to Clark street, returning same route.	2.03	14	2 motors

Total maximum number of cars operated	1116
The above total is made up as follows:	
Cable grip cars	170
Cable trail cars	340
Electric motor cars	508
Electric trail cars	97
Horse car	1
	1116

	Miles Round Trip.	Time Round Trip, Minutes.	Maximum Number of Cars Operated.
MILWAUKEE AVENUE NIGHT CAR.			
From station at Armitage and Campbell avenues west on Armitage avenue to California avenue; south on California avenue to North avenue; east on North avenue to Robey street; south on Robey street to Division street; east on Division street to Milwaukee avenue; south on Milwaukee avenue to Lake street; east on Lake street to Dearborn street; south on Dearborn to Randolph street; east on Randolph to State street; north on State to Lake street, and return same route.	10.97	80	
BLUE ISLAND AVENUE NIGHT CAR.			
From Blue Island and Western avenues, northeast to Leavitt street; north on Leavitt to 21st street; east on 21st to Center avenue; north			

	Miles Round Trip.	Time Round Trip, Minutes.
BLUE ISLAND AVENUE NIGHT CAR—Continued.		
on Center avenue to Adams street; east on Adams to Fifth avenue; north on Fifth avenue to Lake street; east on Lake to Dearborn street; south on Dearborn to Randolph street; east on Randolph to State street; north on State to Lake street; returning west on Lake street to Fifth avenue; south on Fifth avenue to Adams street; west on Adams street to Center avenue; south on Center to 21st street; west on 21st to Leavitt street; south on Leavitt to Blue Island avenue; southwest on Blue Island avenue to Western avenue.	11.18	80
HALSTED STREET NIGHT CAR.		
From Halsted street station, north on Halsted to Randolph street; east on Randolph street to Fifth avenue; north on Fifth avenue to Lake street; east on Lake to Dearborn street; south on Dearborn street to Randolph street; east on Randolph to State street; north on State to Lake street, returning west on Lake street to Fifth avenue; south on Fifth avenue to Randolph; west on Randolph to Halsted street and south on Halsted street to station.	7.05	60
OGDEN AVENUE NIGHT CAR.		
From station, northeast on Ogden avenue to Randolph street; east on Randolph street to Clinton street; north on Clinton to Lake street; east on Lake to Dearborn street; south on Dearborn to Randolph street; east on Randolph to State street; north on State to Lake street, returning west on Lake street to Clinton street; south on Clinton street to Randolph street; west on Randolph to Ogden avenue; southwest on Ogden avenue to 40th ave nue.	11.88	72
TWELFTH STREET NIGHT CAR.		
From 12th street and 40th avenue, east on 12th street to Fifth avenue; north on Fifth avenue to Lake street; east on Lake to Dearborn street; south on Dearborn to Randolph street; east on Randolph to State street, returning west on Lake street to Fifth avenue; south on Fifth avenue to 12th street, and west on 12th street to 40th avenue.	12.79	84

	Miles Round Trip.	Time Round Trip, Minutes.
VAN BUREN STREET NIGHT CAR.		
From Kedzie avenue and Van Buren street, east on Van Buren street to Fifth avenue; north on Fifth avenue to Lake street; east on Lake to Dearborn street; south on Dearborn to Randolph street; east on Randolph to State street; north on State to Lake, returning west on Lake street to Fifth avenue; south on Fifth avenue to Van Buren street, and west on Van Buren to Kedzie avenue.	9.40	72
ROBEY STREET NIGHT CAR.		
From Fullerton avenue and Robey street, south on Robey street to Fourteenth street, returning same route.	8.52	60
GRAND AVENUE NIGHT CAR.		
From 40th street and North avenue, south on 40th to Grand avenue; east on Grand avenue to Halsted street; south on Halsted to Lake street; east on Lake to Dearborn street; south on Dearborn to Randolph street; east on Randolph to State street; north on State street to Lake street, returning west on Lake street to Halsted street; north on Halsted to Grand avenue and west on Grand avenue to 40th, and north on 40th to North avenue.	12.21	90
MADISON STREET NIGHT CAR.		
From 40th and Madison streets, east on Madison to State street, returning same route.	10.20	100
DIVISION STREET NIGHT CAR.		
From California avenue and Division street, east on Division street to Milwaukee avenue; south on Milwaukee avenue to Lake street; east on Lake street to Dearborn street; south on Dearborn street to Randolph street; east on Randolph to State street; north on State to Lake street; west on Lake street, returning same route.	8.64	70
CHICAGO AVENUE NIGHT CAR.		
From California avenue and Armitage, south on California avenue to Chicago avenue; east on Chicago avenue to Clark street, returning same route.	9.87	64

	Miles Round Trip.	Time Round Trip, Minutes.
PAULINA NIGHT CAR.		
From Wood street and Clybourn place, east on Clybourn place to Ashland avenue; south on Ashland avenue to Lake street; west on Lake street to Paulina street; south on Paulina street to Twelfth street; east on Twelfth street to Ashland avenue; south on Ashland avenue to 22nd street, returning same route.	9.66	80
LIMITS NIGHT CAR.		
From limits station, south on Clark street to Washington street, returning same route.	7.16	80
LINCOLN AVENUE NIGHT CAR.		
From Lincoln avenue station, south on Lincoln avenue to Center street; east on Center to Clark street; south on Clark to Washington street, returning same route.	7.46	80
CLYBOURN AVENUE NIGHT CAR.		
From Clybourn and Belmont avenues, south on Clybourn avenue to Halsted street; south on Halsted to Division street; east on Division to Crosby street; south on Crosby street to Larrabee street; south on Larrabee to Chicago avenue; east on Chicago avenue to Orleans street; south on Orleans to Kinzie street; east on Kinzie to Clark street; south on Clark to Washington, returning north on Clark street to Kinzie street; west on Kinzie to Orleans street; north on Orleans to Chicago avenue; west on Chicago avenue to Larrabee street; north on Larrabee to Crosby street; north on Crosby to Division street; west on Division to Halsted street; north on Halsted to Clybourn avenue; northwest on Clybourn to Belmont avenue.	10.84	70
LARRABEE STREET NIGHT CAR.		
From Belden avenue and Racine avenue, south on Racine avenue to Webster avenue; east on Webster avenue to Larrabee street; south on Larrabee street to Chicago avenue; east on Chicago avenue to Orleans street; south on Orleans to Kinzie street; east on Kinzie to Clark street; south on Clark to Washington street, returning north on Clark street to Kinzie street; west on Kinzie street to Orleans		

	Miles Round Trip.	Time Round Trip. Minutes.
LARRABEE STREET NIGHT CAR—Continued.		
street; north on Orleans to Chicago avenue; west on Chicago avenue to Larrabee street; north on Larrabee to Lincoln avenue; northwest on Lincoln avenue to Fullerton avenue; west on Fullerton to Racine avenue; south on Racine to Belden avenue.	8.40	68
NORTH AVENUE NIGHT CAR.		
From North avenue and Clark street, west on north avenue to California avenue, returning same route.	6.66	56
CLARK TO LAWRENCE NIGHT CAR.		
From Limits station, north on Clark street to Lawrence avenue, returning same route.	6.01	40
EVANSTON AVENUE NIGHT CAR.		
From Limits station, north on Clark to Evanston avenue; north on Evanston avenue to Halsted street; north on Halsted to Evanston avenue; north on Evanston avenue to Devon avenue; west on Devon avenue to Clark street; north on Clark street to Calvary, returning same route.	14.84	50
HALSTED AND 21ST STREET NIGHT CAR.		
From Halsted and Clark streets, south on Halsted to 21st street, returning same route.	13.53	100

APPENDIX B.

Present Routes, Length of Round Trip, Time and Maximum Number of Cars Operated.

CHICAGO CITY RAILWAY COMPANY.

FROM	TO	VIA	Miles Round Trip.	Time Round Trip. Mnts.	Maximum Number of Cars Operated.
Randolph & Wabash	39th & Cottage Grove	Loop, Wabash, 22nd, Cottage G	9.18	76	28 grip 28 trail
" "	56th & Lake Avenue	Loop, Wabash, 22nd, Cottage G., 55th, Loop	15.48	116	32 grip 64 trail
" "	71st & Cottage Grove	Loop, Wabash, 22nd, Cottage G	17.33	123	34 grip 68 trail
" "	39th and Indiana	Loop, Wabash, 18th, Ind	8.92	70	27 motor
" "	51st and Grand blvd	Loop, Wabash, 18th, Ind., 51st	12.36	90	33 motor
Lake and State	39th and State	Loop, State	8.73	77	38 grip 38 trail
" " "	63d and State	Loop, State	14.70	111	51 grip 51 trail
Washington & Clark	69th and Wentworth	Clark, 22nd, Wentworth	15.84	105	50 motor
" "	79th and Halsted	Clark, 22nd, Wentworth Vincennes, 79th	19.45	125	56 motor
" "	63d and Center	Clark, Archer, Canal, 29th, Wallace, Root, Halsted, 47th, Center	16.60	111	25 motor
" "	75th and Center (R.R.)	Clark, Archer, Canal, 29th, Wallace, Root, Halsted, 47th, Center	19.55	127	27 motor
" "	69th and Halsted	Clark, Archer, Halsted	16.65	113	46 motor
O'Neil & Halsted	79th and Halsted	Halsted	13.77	90	35 motor
Lake and State	300 ft. S. 69th & Ashland	Loop, State, Archer, Ashland	18.51	130	41 motor
Archer and Halsted	300 ft. S. 69th and Ashland	Archer, Ashland	11.99	72	12 motor
Archer and Western	71st and Western	Western	8.47	60	3 motor
38th and Kedzie	63d and Central Park	Kedzie, 63d	7.24	42	2 motor
Lake and State	City Limits	Loop, State, Archer	18.71	130	12 motor
" " "	38th and Central Park	Loop, State, Archer, 38th	14.60	110	25 motor
Cottage Grove	Halsted	26th	3.00	27	5 motor
Illinois Central	Archer	31st, Pitney	5.43	45	17 motor
Cottage Grove	California	35th	8.67	63	21 motor
" "	Stock Yards	39th, Halsted, Root	4.81	44	11 motor
Illinois Central	" "	43d, State, Root	5.58	47	19 motor
" "	Western and 47th	47th	9.57	68	28 motor
Western	Kedzie and 47th	47th	2.00	14	1 motor
Wallace and 51st	Wood and 51st	51st	3.00	20	2 motor
Stewart and 51st	Grand blvd. and 51st	51st	1.92	15	1 motor
Washington ave	Leavitt and 59th	61st, State, 59th	9.84	65	14 motor
Stony Island (S. Loop	Ashland	Loop, 63d	8.36	59	25 motor
Ashland and 63d	Central av	63d	10.15	54	4 motor
Cottage G. and 68th	69th and Western	68th, Keefe, 69th	8 22	56	16 motor
Grand Crossing	Cottage Grove	South Chicago A	1.38	12	1 motor
State and Vincennes	State, Vincennes	63d, State to 73d & Vincennes	2.62	18	2 motor

Total number of cars operated, 993

The above total is made up as follows:—

Cable Grip Cars.......183
" Trail " 249
Electric Motor Cars...561

993

APPENDIX C.

Recommended Routes for the Operation of Cars Under a Unification of Management of the Chicago City Railway Company and the Chicago Union Traction Company.

Route No.	FROM	TO	VIA	Length Round Trip	Time Round Trip Mnts.	Headway.	No. Cars Operated
1	71st Street	Devon Ave.	Cottage Grove, 22nd, Wabash A., Subway North Clark, Evanston Ave.	34.0	240	15	16
2	57th and Lake A.	Howard Ave.	Lake Ave., 55th, Cottage Grove, 22nd, Wabash, Subway, No. Clark	35.3	255	15	17
3	71st Street	Rose Hill Cemetery	Cottage G., 22nd, Wabash, Subway, Wells, N. Clark, Center, Lincoln, N. Robey.	34.7	255	15	17
4	57th and Lake Ave.	Belmont A.	Lake, 55th, Cottage G., 22nd, Wabash, Subway, Wells, Division, Clybourn	26.3	180	15	12
5	71st Street	Lincoln and Belmont	Cottage G., 22nd, Wabash, Subway, Wells, N. Clark, Center, Lincoln	26.6	190	5	38
6	57th and Lake	Lawrence A.	Lake, 55th, Cottage G., 22nd, Clark, Subway, Milwaukee	34.2	240	15	16
7	51st Street	Devon Ave.	Indiana, 18th, Wabash, Subway, N. Clark, Evanston	28.2	195	15	13
8	51st Street	Howard Ave.	Indiana, 18th, Wabash, Subway, N. Clark	31.8	225	15	15
9	79th Street & Halsted	Devon Ave.	79th, Vincennes, State, Subway N. Clark, Evanston.	36.3	255	15	17
10	79th and Halsted	Howard A.	79th, Vincennes, State, Subway, N. Clark	39.6	270	15	18
11	63d and Stony Island	Rose Hill Cemetery	63rd, State, Subway, Wells, Lincoln, N. Robey.	35.6	255	15	17
12	63d and Stony Island	Belmont A.	63rd, State, Subway, Wells, Division, Clybourn	29.3	210	15	14
13	63d and Stony Island	Sheffield & N. Clark.	63rd, State, Subway, Wells, Lincoln and Sheffield	28.0	200	5	40
14	63d and Stony Island	Lawrence A.	63rd, State, 18th, Clark, Subway, Milwaukee	37.3	255	15	17
5	Archer & West 48th Ave.	Wells & Clark St.	Archer, Clark, Subway, Wells	23.0	165	15	11
16	Wentworth and Vincennes	N. Clark & Diversey	Wentworth, Clark, Subway, N. Clark	24.0	165	15	11
17	26th St. & W. 46th Av.	Wells & N. Clark	26th St., Blue Island A., Halsted, Van Buren, Subway, Wells	19.1	120	15	8
18	W. 40th Ave. & Ogden Ave.	North Ave., N. Clark	Ogden, Madison, Subway, N. Clark	15.4	165	15	11
19	79th Street	Evanston A.	Halsted	27.5	190		
20	69th Street	N. Clark	Ashland, 12th, Paulina, Lake, Ashland, Clybourn and Southport	27.0	190	5 10	38 19
21	Blue Island Ave.	Rose Hill Cemetery	Robey Street	19.5	140	10	14
22	71st Street	Belmont A.	Western Avenue	24.0	170	10	17
23	63rd Street	Belmont A.	Kedzie A., Chicago A., California A	23.0	150	15	10
24	Western A.	Cottage G. & 68th St.	69th Street	8.2	57	3	19
25	Central A.	Stony Island Ave.	63rd Street	18.25	126	18	7
26	Leavitt St.	Jefferson A. & Midway.	59th and 61st	9.8	70	10	7
27	Wood St.	Washington P.	51st Street	5.5	40	10	4
28	Kedzie Ave.	I. C. R. R.	47th Street	11.6	80	5	16
29	Stock Yards	I. C. R. R.	Root and 43rd	5.6	40-2	2-4	18
30	Stock Yards	Cottage G. A.	Root, Halsted, 39th	4.8	36	4	9

APPENDIX C.—Continued.

Route No.	FROM	TO	VIA	Length Round Trip	Time Round Trip Mnts.	Headway.	No. Cars Operated.
31a	38th & Central Park A	Cottage G.	38th, Archer A. & 35th Sts.	8.6	60	5	12
31b	35th & California Av.	Cottage G.	35th Street	10.9	75	5	15
32	Pitney Ct	I. C. R. R.	31st Street	5.5	40	2½	16
33	Halsted	Cottage G.	26th Street	3.0	20	5	4
34	Blue Island Ave.	State St	Leavitt & 18th	7.0	48	6	8
35	Robey St.	12th and Wabash	14th, Canal & 12th	5.66	40	10	4
36	48th Ave.	Michigan Ave. and Monroe	Loop 1, 12th Street	14.16	99	1½	66
37	Kedzie	Wabash and Monroe	Loop 2, Harrison Street	9.0	65	2½	26
38	Kedzie	State and Monroe	Loop 3, Van Buren	8.5	60	2	30
39	21st and Douglas P. Blvd.	Dearborn and Monroe	21st, Center ave, Adams street, Loop No. 4	10.8	75	5	15
40	Clybourn Pl. & Ashland.	Dearborn and Monroe	Ashland ave., Erie, Center Austin, Sangamon, Adams, Loop No. 4	9.6	65	5	13
41	W. 60th Ave.	State and Monroe.	Madison street, Loop No. 7	15.16	110	5	22
42	W. 60th Ave.	Michigan & Monroe.	Lake street, Loop No. 5	16.1	110	10	11
43	40th Ave & N. Ave.	State street	Grand ave., Loop No. 11	12.8	90	10	9
44	40th Ave.	N. Clark street.	Chicago ave.	9.7	68	5	14
45	California	N. State street	Division street	7.0	49	6	8
46	46th Ave.	N. Clark street.	North ave	11.2	80	5	16
47	Ashland Ave.	Stony Island ave.	63rd street	8.2	60	7½	8
48	Ashland & 63rd St.	Monroe & Dearborn	63d, Wentworth, 22nd, Clark Subway Loop 10	17.4	120	3	40
49	39th St.	Wabash and Monroe.	Indiana, 18th, Wabash and Subway Loop 8.	8.0	56	2	28
50	Belmont A. & Milwaukee	Dearborn & Monroe.	Belmont ave., Lincoln ave. Sedgwick, Orleans, Indiana, Subway Loop 13	16.0	114	6	19
51	Lincoln Ave. & Foster Ave.	Dearborn & Monroe.	Lincoln, Sedgwick, Orleans Indiana, Subway Loop 13	16.0	114	6	19
52	Fullerton & Milwaukee	Dearborn & Monroe.	Fullerton, Lincoln, Larrabee Chicago, Orleans, Indiana, Subway Loop 13.	13.2	90	6	15
53	35th & Cottage Grove.	Dearborn & Monroe.	35th, Wentworth, 22nd, Clark, Loop 10.	9.3	60	5	13
54	Center Ave. & 63rd St.	Monroe & Dearborn	Center, 47th, Halsted, Archer Clark, Subway Loop No. 10.	15.8	111	3	37
55	Blue Island & 26th St.	Clark and Adams.	Blue Island, Halsted, Van Buren, Loop 15.	8.2	59-5	3½	17
56	North Ave. and Milwaukee	Wabash and Monroe	North ave., N. Clark, Indiana, Subway Loop No. 11.	9.4	65	5	13
57	Division & Milwaukee	State and Monroe.	Division, Wells, Indiana, Subway Loop No. 12.	7.1	50	10	5
58	Armitage & 44th ave.	Clark and Monroe	Armitage, Milwaukee, Desplaines, Washington, Subway Loop 14	14.3	99	3	33
59	North ave. & 46th st.	Clark and Monroe	North ave., Milwaukee, Desplaines, Washington, Subway Loop 14	13.4	100	5	20
60	Division & California	Clark and Monroe	Division, Milwaukee, Desplaines, Washington, Subway Loop 14.	8.6	60	5	12
61	California & Belmont	Clark and Monroe	California, Chicago, Milwaukee, Desplaines, Washington, Subway Loop No. 14.	14.	95	5	19
62	40th and North Ave.	Michigan and Monroe	40th, Grand ave., Halsted Lake, Surface Loop No. 5.	12.88	90	10	9
63	Evanston ave. and Halsted	Van Buren & Halsted.	Halsted	10.0	67-5	7½	9
64	Ogden ave. and 40th ave.	Wabash and Monroe.	Ogden, Randolph, Surface Loop 6	12.1	100	4	25
65	26th and W. 40th ave.	Clark and Adams	26th, Blue Island, Halsted Van Buren, Subway Loop No. 15.	12.48	90	15	6
66	38th and Central Pk. ave.	Clark and Adams.	38th, Archer, Halsted, Van Buren, Subway Loop No. 15	14.00	90	15	6
67	Archer and Western ave	Clark and Adams.	Archer, Halsted, Van Buren, Subway Loop No. 15.	10.8	75	3	25
68	Ashland and 69th.	Clark and Adams.	Ashland, Archer, Halsted, Van Buren, Subway Loop No. 15.	18.2	126	1¾	72
69	Center and 75th st.	Clark and Adams	Center, 47th, Halsted, Van Buren, Subway Loop No. 15.	19.4	135	3	45

APPENDIX C.—Continued.

Route No.	FROM	TO	VIA	Length Round Trip	Time Round Trip Mts.	Headway	No. Cars Operated.
70	Halsted and 79th st...	Dearborn and Monroe	Halsted, Archer, Clark, Subway Loop No. 10.	18.3	128-25	2-4	57
71	Stock Yards..........	Dearborn and Monroe	Root, Wallace, 29th, Canal, Archer, Clark, Subway Loop No. 10................	10.8	78.75	1¾	48
72	Wentworth and Vincennes	Dearborn and Monroe	Wentworth, 22nd, Clark, Subway Loop No. 10............	17.3	120	4	30
73	Loop No. 8............	55th st.................	Wabash, 22nd and Cottage Grove	12.6	90	1-2	60
74	51st and South Park ave.	Wabash and Monroe .	51st, Indiana, 18th, Wabash, Subway Loop No. 8........	11.7	80	4	20
75	71st and Cottage Gr...	Wabash and Monroe .	Cottage Grove, 22nd, Wabash, Subway Loop No. 8.........	17.0	120	15	8
76	57th and Lake	Wabash and Monroe .	Lake, 55th, Cottage Grove, 22nd, Wabash, Subway Loop No. 8	14.8	110	2¼	48
77	Jefferson ave. and Midway	State and Monroe	61st, State, Subway Loop No. 9......................	17.5	120	10	12
78	59th and Leavitt......	Dearborn and Monroe	59th, Wentworth, 22nd, Clark, Subway Loop No. 10....,...	18.2	130	10	13
79	47th and I. C. R. R. ..	State and Monroe.....	47th, State, Subway Loop No. 9......................	13.6	95	5	19
80	47th and Western ave..	Dearborn and Monroe	47th, Wentworth, 22nd, Clark, Subway Loop No. 10.......	17.6	125	5	25
81	35th and California...	Dearborn and Monroe	35th, Wentworth, 22nd, Clark, Subway Loop No. 10........	13.6	95	5	19
82	Southport ave. and N. Clark	Dearborn and Monroe	Southport, Clybourn, Division, Orleans, Indiana, Subway Loop No. 13............	12.4	80	10	8
83	Clybourn Pl. and Ashland.................	Wabash & Monroe ..	Ashland, Lake, St. Johns Pl., Randolph, Surface Loop No. 6............	9.6	70	10	7
84	Ashland and 22d st....	State and Monroe	Ashland, 12th, Paulina, Madison, Surface Loop No. 7...	8.7	60	10	6
85	Robey and North ave.	State and Monroe.....	Robey and Madison, Surface Loop No. 7..................	9.2	60	10	6
86	Robey & Blue Island ave.	State and Monroe. ...	Robey, Madison, Surface Loop No. 7	9.7	70	10	7
87	Western and Milwaukee ave.............	State and Monroe.....	Western, Madison, Surface Loop No. 7..................	11.0	80	10	8
88	26th and Western.....	State and Monroe.....	Western, Madison, Surface Loop No. 7	11.0	80	10	8
89	Clybourn & Belmont..	Dearborn and Monroe	Clybourn, Division, Wells, Indiana, Subway Loop No. 13.......................	7.66	55	5	11
90	Taylor and Western..	Surface Loop No. 2. ...	Canal and Harrison	7.66	55	5	11
91a	Colorado and W. 40th .	State and Monroe....	Colorado, Madison, Loop No. 7.	10.33	70	5	14
91b	Western and Roscoe Blvd.................	Ashland and Irving Park	Roscoe, N. Robey, Belmont & Ashland ave..	4.5	30	5	6
92	Kedzie and Ogden ave	State and Monroe.....	Kedzie, Madison, Loop No. 7	11.33	60	5	16
93	Kedzie and Chicago ave.	State and Monroe	Kedzie, Madison, Loop No. 7	29.16	70	5	14
94	Diversey and Clark...	39th & Cottage Grove	N. Clark, Subway A, Wabash ave., 22nd, Cottage Grove..	16.5	117	1-2	78
95	Diversey and Clark..	39th and State	N. Clark, Subway B, State...	15.7	111	1-2	74

The foregoing routing has been prepared with the idea of serving all the streets at present served and under the same headway, in order to show that a unified system could be operated with no more Cars than are being furnished under the present operation. Owing to the increase in speed obtained by the abandonment of the Cable and the greater facility in the movement of Cars operated as through routes, with 200 cars less in use, a service is yet maintained equal to the present. It can be seen that the addition of these 200 cars to the above headways would give an increased service over that given at the present time without increasing the expense of operating. The rearrangement of terminal facilities as recommended will provide room for the increase of cars needed at present and for future demands.

APPENDIX D.

Recommended Routes in Business District for the Operation of Cars Under Divisional Ownership, with Joint Use of Tracks, as Shown on Map No. 3.

Lines entering from the West Division shown in green. Lines entering from North Division shown in yellow. Lines entering from the South Division shown in brown. Where tracks are used jointly the colors in the broken lines indicate the lines from each division which operate over the tracks. The tracks necessary to add, to form the local distributing system, are shown in red, which distributing system is fully described in Part 5.

ENTRANCE OF WEST DIVISION LINES.

LINES ENTERING OVER LAKE STREET BRIDGE—

East on Lake Street to Franklin; South on Franklin to Randolph; East on Randolph to State Street; South on State to Madison; West on Madison to Fifth Avenue; North on Fifth Avenue to Randolph; West on Randolph to Franklin; North on Franklin to Lake, thence West on Lake to point of entrance.

LINES ENTERING OVER RANDOLPH STREET BRIDGE—

Cars entering over Randolph Street bridge traverse the same loop.

LINES ENTERING OVER MADISON STREET BRIDGE—

East on Madison Street to State Street; South on State to Monroe; West on Monroe to Fifth Avenue; North on Fifth Avenue to Madison Street, thence West to point of entrance.

LINES ENTERING OVER ADAMS STREET BRIDGE—

East on Adams Street to Fifth Avenue; North on Fifth Avenue to Monroe; East on Monroe to State Street; South on State to Adams; West on Adams to point of entrance.

LINES ENTERING OVER VAN BUREN STREET BRIDGE—

East on Van Buren to Fifth Avenue; North on Fifth Avenue to Adams; East on Adams to State; South on State to Van Buren; thence West to point of entrance.

LINES ENTERING OVER HARRISON STREET BRIDGE—

East on Harrison to Clark; North on Clark to Van Buren; East on Van Buren to State; South on State to Harrison, thence West on Harrison to point of entrance.

LINES ENTERING OVER 12TH STREET BRIDGE—

East on Twelfth Street to Fifth Avenue; North on Fifth Avenue to Harrison; East on Harrison to Clark; North on Clark to Van Buren; East on Van Buren to State; South on State to Harrison; thence West on Harrison to Fifth Avenue; South on Fifth Avenue to Twelfth Street, thence West on Twelfth Street to point of entrance.

By this routing one side of each West Division Loop reaches State Street.

ENTRANCE OF NORTH DIVISION LINES.

LINES ENTERING OVER STATE STREET BRIDGE—

South on State Street to Harrison; East on Harrison to Wabash Avenue; North on Wabash Avenue to Lake; West on Lake to State; thence North on State to point of entrance.

LINES ENTERING OVER DEARBORN STREET BRIDGE—

South on Dearborn Street to Harrison; East on Harrison to State; North on State Street to Lake; West on Lake to Dearborn; North on Dearborn to point of entrance.

LINES ENTERING OVER CLARK STREET BRIDGE—

South on Clark to Harrison; East on Harrison to Dearborn Street; North on Dearborn Street to Lake; West on Lake to Clark; North on Clark to point of entrance.

LINES ENTERING OVER WELLS STREET BRIDGE—

South on Wells to Lake; East on Lake to Clark; South on Clark to Harrison; East on Harrison to Dearborn; North on Dearborn to Lake; West on Lake to Wells, thence North on Wells to point of beginning.

By this routing all lines on two loops reach State Street and as far South as Harrison Street and on one loop reach as far East as Dearborn Street and as far South as Harrison Street.

ENTRANCE OF SOUTH DIVISION LINES.

WABASH AVENUE LINE—

North on Wabash Avenue to Harrison Street; West on Harrison to State; North on State to Lake; East on Lake Street to Wabash Avenue; South on Wabash Avenue to point of entrance.

STATE STREET LINE—

North on State Street to Randolph; West on Randolph to Dearborn; South on Dearborn to Harrison; East on Harrison to State; thence South on State to point of entrance.

LINES ENTERING ON CLARK STREET—

North on Clark Street to Harrison; East on Harrison to Dearborn; North on Dearborn to Randolph Street; West on Randolph to Clark; South on Clark to point of entrance.

By this routing the Wabash Avenue line reaches as far North as Lake Street, and the State Street line as far North as Randolph Street, both traversing State Street, and the Clark Street line reaches as far North as Randolph Street and East as far as Dearborn Street.

The through routing of cars between all divisions is made practicable under the arrangement shown on Map 3 by connecting the different loops at suitable points with the tracks on the North and South Streets, thus permitting any desired combination of routes to be made with through cars.

APPENDIX E.

Schedule Showing Points at Which Transfers Are Issued and Received by the Chicago City Railway Co.

TRANSFER POINTS ON COTTAGE GROVE AVENUE LINES.

NO. 1 A.

South bound Cottage Grove Ave. cars issue transfers, for cash fares or transfers, to west bound 26th St. cars, 35th St. cars, 39th St. cars and 69th St. cars, to east or west bound 31st St. cars, 43d St. cars, 47th St. cars, 61st St. cars and 63d St. cars, and to southwest bound South Chicago Ave. cars, and at 18th St. to south bound Indiana Ave. cars.

NO. 1 B.

South bound Cottage Grove Ave. cars receive transfers from east bound 26th St. cars, 35th St. cars, 39th St. cars and 69th St. cars, from east or west bound 31st St. cars, 43d St. cars, 47th St. cars, 61st St. cars and 63d St. cars.

NO. 1 A.

North bound Cottage Grove Ave. cars issue transfers, for cash fares or transfers, to west bound 69th St. cars, 39th St. cars, 35th St. cars and 26th St. cars, to east or west bound 63d St. cars, 61st St. cars, 47th St. cars, 43d St. cars and 31st St. cars, and east bound 55th St. cars; also from north bound 55th St. Cottage Grove Ave. cars transfers are issued to south bound 71st St. Cottage Grove Ave. cars.

NO. 1 B.

North bound Cottage Grove Ave. cars receive transfers from east bound 69th St. cars, 39th St. cars, 35th St. cars and 26th St. cars, from east or west bound 63d St. cars, 61st St. cars, 47th St. cars, 43d St. cars and 31st St. cars, and from north bound South Chicago Ave. cars.

SPECIAL.

Passengers paying fare either in cash or transfer slips on the "short" line cars will be transferred to the "continuation" or "through" cars of the same line at 39th St. from the 39th St. Cottage Grove Ave. cars to the 71st St. or 55th St. Cottage Grove Ave. cars, and at 55th St. from the 55th St. Cottage Grove Ave. cars to the 71st St. Cottage Grove Ave. cars. Transfers from the through cars may be issued on "cash" transfers, received from short trip cars of same line, the same as for cash fares. Passengers may be transferred to the Cottage Grove Ave. line, via the 63d St. line, on transfers from north bound cars of the Halsted, Wentworth and State St. lines, and vice versa. Transfers may be issued from the 31st St. cars to Cottage Grove Ave. cars on "cash" transfers, from east bound Archer Ave. cars, the same as for cash fares.

TRANSFER POINTS OF INDIANA AVENUE LINES.

NO. 1 A.

South bound Indiana Ave. cars issue transfers for cash fares or transfers to east or west bound 26th St. cars, 31st St. cars, 35th St. cars, 39th St. cars, 43d St. cars, 47th St. cars, 51st St. cars, and at 18th and Wabash Ave. to south bound Cottage Grove Ave. cars.

NO. 1 B.

South bound Indiana Ave. cars receive transfers from east or west bound 26th St. cars, 31st St. cars, 35th St. cars, and at 18th St. and Wabash Ave. from south bound Cottage Grove Ave. cars.

NO. 1 A.

North bound Indiana Ave. cars issue transfers, for cash fares or transfers, to east or west bound 47th St. cars, 43d St. cars, 39th St. cars, 35th St. cars, 31st St. cars, 26th St. cars, and at 18th St. and Wabash to north bound Cottage Grove Ave. cars.

NO. 1 B.

North bound Indiana Ave. cars receive transfers from east or west bound 51st St. cars, 47th St. cars, 43d St. cars, 39th St. cars, 35th St. cars, 31st St. cars and 26th St. cars.

SPECIAL.

Passengers paying fare, either in cash or transfer slips, on the 39th St. Indiana Ave. cars, will be transferred to the "continuation" or "through" cars of the same line at 39th St. to the 51st St. Indiana Ave. cars. Transfers from the through cars may be issued on "cash" transfers, received from short trip cars of same line, the same as for cash fares. Transfers may be issued from the 31st St. cars to Indiana Ave. cars on "cash" transfers, from east bound Archer Ave. cars, the same as for cash fares.

TRANSFER POINTS OF THE STATE STREET LINES.

NO 1 A.

South bound State St. cars issue transfers, for cash fares or transfers, to east or west bound 26th St. cars, 31st St. cars, 35th St. cars, 39th St. cars, Root and 43d St. cars, 47th St. cars, 51st St. cars, 59th and 61st St. cars and 63d St. cars and to south bound State and Vincennes Ave. cars, and at 19th St. to west bound Archer Ave. cars.

NO. 1 B.

South bound State St. cars receive transfers from east or west bound 26th St. cars, 31st St. cars, 35th St. cars, 39th St. cars, 47th St. cars, 51st St. cars, Root and 43d St. cars, 59th and 61st St. cars.

NO 1 A.

North bound State St. cars issue transfers, for cash fares or transfers, to east or west bound 59th and 61st St. cars, 51st St. cars, 47th St. cars, 39th St. cars, 35th St. cars, 31st St. cars and 26th St. cars, and Root and 43d St. cars

NO. 1 B.

North bound State St. cars receive transfers from east or west bound 63d St. cars, 59th and 61st St. cars, 51st St. cars, 47th St. cars, 39th St. cars, 35th St. cars, 31st St. cars, 26th St. cars, and Root and 43d St. cars, and from north bound State and Vincennes Ave. cars at 63d St.

SPEÇIAL.

Passengers paying fare either in cash or transfer slips on the 39th St. State St. cars will be transferred to the 63d St. State St. cars at 39th St. and transfers will be issued from the "through" 63d St. cars on the "cash" transfers received from the short trip 39th St. cars, the same as for cash fares. Transfers may be issued from the 31st St. cars to the State St. cars on "cash" transfers, from east bound Archer Ave. cars, the same as for cash fares. Passengers may be transferred to the State St. cars via 63d St. cars on transfers from north bound Halsted St. or Wentworth Ave. cars and vice versa.

TRANSFER POINTS OF THE WENTWORTH AVE. LINES.

NO 1 A.

South bound Wentworth Ave. cars issue transfers, for cash fares or transfers, to west bound Archer or Ashland Ave. cars at Clark St., to east or west bound 26th St. cars, 31st St. cars, 36th St. cars, 39th St. cars, Root and 43d St. cars, 47th St. cars, 51st St. cars and 61st St. cars, 63d St. cars and 69th St. cars; and to north bound Halsted St. cars at 79th St. for cash fares only, collected south of 69th St. and south on Vincennes Ave. at 77th St.

NO. 1 B.

South bound Wentworth Ave. cars receive transfers from east or west bound 26th St. cars, 31st St. cars, 35th St. cars, 39th St. cars, Root and 43d St. cars, 47th St. cars, 51st St. cars, 59th St. and 61st St. Cars, 63d St. cars and 69th St. cars; and from south bound State and Vincennes Ave. cars at 73d St.

NO 1 A.

North bound Wentworth Ave. cars issue transfers, for cash fares or transfers, to east or west bound 69th St. cars, 63d St. cars, 59th and 61st St. cars, 51st St. cars, 47th St. cars, Root and 43d St. cars, 39th St. cars, 35th St. cars, 31st St. cars, 26th St. cars, and to north bound State and Vincennes cars at 73d St. and north on Vincennes Ave. at 77th St.

NO. 1 B.

North bound Wentworth Ave. cars receive transfers from east or west bound 69th St. cars, 63d St. cars, 59th and 61st St. cars, 51st St. cars, 47th St. cars, 43d St. cars, 39th St. cars, 35th St. cars, 31st St. cars, 26th St. cars, and from south bound Halsted St. cars at 79th St. for cash fares collected south of 69th St.

SPECIAL.

Passengers paying fare either in cash or transfer slips on 69th St. Wentworth Ave. cars will be transferred to 79th St. Wentworth Ave. cars at 69th St. and transfers issued from through 79th St. cars, the same as for cash fares. Transfers from 31st St. cars may be issued to Wentworth Ave. cars on "cash" transfers from east bound Archer Ave. cars, the same as for cash fares. Passengers may be transferred to the State or Cottage Grove line via 63d St. cars, on transfers from north bound Wentworth Ave. cars and vice versa.

TRANSFER POINTS OF THE HALSTED STREET LINES.

NO. 1 A.

South bound 69th and Halsted St. cars issue transfers, for cash fares or transfers, to east or west bound 31st St. cars, 35th St. cars, 39th St. cars, 47th St. cars, 51st St. cars, 59th and 61st St. cars, 63d St. cars and 69th St. cars, and to east bound

26th St. cars, Root and 43d St. cars, and to west bound Archer Ave. cars at Halsted and to Ashland Ave. and Archer Ave. cars at Clark St.

NO. 1 B.

South bound 69th and Halsted St. cars receive transfers from east or west bound 31st St. cars, 35th St. cars, 39th St. cars, 47th St. cars, 51st St. cars, 59th and 61st St. cars, 63d St. cars, and from west bound 26th St. cars, Root and 43d St. cars, and from Ashland Ave. and Archer Ave. cars south bound at Clark St.

NO. 1 A.

North bound 69th and Halsted St. cars issue transfers, for cash fares or transfers, to east or west bound 63d St. cars, 59th St. and 61st St. cars, 51st St. cars, 47th St. cars, Root and 43d St. cars, 39th St. cars, 35th St. cars, 31st St. cars, and to east bound 26th St. cars and to west bound Archer Ave. cars at Halsted.

NO. 1 B.

North bound 69th and Halsted St. cars receive transfers from east or west bound 63d St. cars, 69th St. cars, 59th St. and 61st St. cars, 51st St. cars, 47th St. cars, Root and 43d St. cars, 39th St. cars, 35th St. cars, 31st St. cars, and from west bound 26th St. cars.

NO 2 A.

South bound O'Neil and Halsted St. cars issue transfers, for cash fares or transfers, to east or west bound 31st St. cars, 35th St. cars, 39th St. cars, Root and 43d St. cars, 47th St. cars, 51st St. cars, 59th and 61st St. cars, 63d St. cars, 69th St. cars, and to east bound 26th St. cars and to west bound Archer Ave. cars at Halsted, and to north bound Wentworth Ave. cars at 79th St. for cash fares only, collected south of 69th St.

NO. 2 B.

South bound O'Neil and Halsted St. cars receive transfers from east or west bound 31st St. cars, 35th St. cars, 39th St. cars, Root and 43d St. cars, 47th St. cars, 51st St. cars, 59th St. and 61st St. cars, 63d St. cars, 69th St. cars, and west bound 26th St. cars, and from Archer Ave. cars at Halsted St. and from west side lines of the Chicago Union Traction Company at O'Neil St. *See special transfer.*

NO 2 A.

North bound O'Neil and Halsted St. cars issue transfers, for cash fares or transfers, to east or west bound 69th St. cars, 63d St. cars, 59th and 61st St. cars, 51st St. cars, 47th St. cars, Root and 43d St. cars, 39th St. cars, 35th St. cars, 31st St. cars, and to east bound 26th St. cars and to west bound Archer Avenue cars at Halsted St., and to West Side lines of Chicago Union Traction Company at O'Neil and Halsted St. for cash fares only. *See special transfer.*

NO. 2 B.

North bound O'Neil and Halsted St. cars receive transfers from east or west bound 69th St. cars, 63d St. cars, 59th and 61st St. cars, 51st St. cars, 47th St. cars, Root and 43d St. cars, 39th St. cars, 35th St. cars, 31st St. cars, and west bound 26th St. cars, and at 79th St. from Wentworth Ave. cars, and from Archer Ave. and Ashland Ave. cars at Halsted St.

SPECIAL.

Passengers paying fare, either in cash or transfer slips, on the 69th and Halsted St. cars, will be transferred to the through 79th O'Neil St. Halsted St. cars at 69th and transfers issued the same as for cash fares. Passengers may be transferred to the State or Cottage Grove line via 63d St. line, on transfers from north bound cars of the Halsted St. lines and vice versa.

"Special" transfers to the "West Side" Halsted St. line of the Chicago Union Traction Company will be issued for cash fares only. Transfers will not be issued on "special" transfers received from the "West Side" Halsted St. line. Transfers "east on Archer at Halsted" will be isued only from north bound O'Neil St. cars. "Special" transfers from the "West Side" Halsted St. line are confined to the following lines: South on Halsted to 79th St., south on Ashland Ave. to 69th St, and west on Archer to 48th Ave., and Archer and Central Park Ave. and 38th St. No transfers being given at any intersecting point to east or west lines. Cash fares on Ashland Ave. lines, Archer Ave. lines and Halsted St. lines entitle the passenger to a "special" transfer to "West Side" Halsted St. lines. Transfers "to Wentworth at 79th St." may be issued only for cash fares collected south of 69th St. Passengers going north on Halsted St. and transferring at Archer and Halsted St. to a south bound Ashland Ave. car, can not transfer to any intersecting east or west line.

TRANSFER POINTS OF THE WALLACE AND CENTER AVENUE LINES.

NO. 1 A.

South bound Wallace and Center Ave. cars issue transfers, for cash fares or transfers, to west bound Archer or Ashland Ave. cars at Clark St., to east or west bound 26th St. cars, 31st St. cars, 35th St. cars, 39th St. cars, 43d St. cars, 47th St. cars, 51st St. cars, 59th St. cars, 63d St. cars and 69th St. cars, and to Ashland Ave. and Archer Ave. cars at Clark St.

NO. 1 B.

South bound Wallace and Center Ave. cars receive transfers from east or west bound 26th St. cars, 31st St. cars, 35th St. cars, 39th St. cars, 43d St. cars, 47th St. cars, 51st St. cars, 59th St. cars, 63d St. cars, and 69th St. cars, and from Archer and Ashland Ave. cars at Clark St.

NO. 1 A.

North bound Wallace and Center Ave. cars issue transfers, for cash fares or transfers, to east or west bound 26th St. cars, 31st St. cars, 36th St. cars, 39th St. cars, 43d St. cars, 47th St. cars, 51st St. cars, 59th St. cars, 63d St. cars, 69th St. cars.

NO. 1 B.

North bound Wallace and Center Ave. cars receive transfers from east or west bound 26th St. cars, 31st St. cars, 35th St. cars, 39th St. cars, 43d St. cars, 47th St. cars, 51st St. cars, 59th St. cars, 63d St. cars and 69th St. cars.

SPECIAL.

Passengers paying fare either in cash or transfer slips on the 63d St. Wallace and Center Ave. cars may be transferred to the 75th St. Wallace and Center Ave. cars at 63d St. and transfers issued from the 75th St. cars, the same as for cash fares.

TRANSFER POINTS OF THE ASHLAND AVENUE LINES.

NO. 1 A.

Except for Halsted St. transfers and "special" transfers from West Side south bound Ashland Ave. cars issue transfers for cash fares, or transfers, to east or west bound 35th St. cars, 47th St. cars, 51st St. cars, 59th St. cars, 63d St. cars, 69th St. cars, and east at Pitney court or Halsted St. to 31st and 26th St. cars and south on State St. at 19th St., and to west bound Archer Ave. cars at Ashland Ave. and east of 26th St. at Halsted and south on Throop St. at Archer Ave. in exchange for "cash" transfers only. See special transfer.

NO. 1 B.

South bound Ashland Ave. cars receive transfers from east or west bound 35th St. cars, 47th St. cars, 51st St. cars, 59th St. cars, 63d St. cars, and at Clark St. from Clark St. cars, and from Archer Ave. and Halsted St. cars at Archer avenue.

NO. 1 A.

North bound Ashland Ave. cars issue transfers, for cash fares or transfers, to east or west bound 63d St. cars, 59th St. cars, 51st St. cars, 47th St. cars, 35th St. cars, and to west bound Archer Ave. cars at Ashland Ave., and north on Clark St. at Archer Ave., and to east bound 26th St. cars at Halsted St., and south bound Throop St. cars at Archer in exchange for "cash" transfers only. See special transfer.

NO. 1 B.

North bound Ashland Ave. cars receive transfers from east or west bound 69th St. cars, 63d St. cars, 59th St. cars, 51st St. cars, 47th St. cars, and 35th St. cars.

SPECIAL

Transfers will not be issued on "special" transfers received from the "West Side" Halsted St. line. "Special" transfers to the "West Side" Halsted St. line will be issued for cash fares only. Transfers will not be issued on transfers received from the Halsted St. line. Transfers "south on Halsted St. at Archer" will be issued only for cash fares. Passengers may be transferred to the Western, Kedzie or Archer Limits lines, via the Archer Ave. line on "cash" transfers from the Ashland Ave. line or vice versa. Passengers from the short lines will be transferred to the through lines of same route and transfers again issued, the same as for cash fares.

TRANSFER POINTS OF THE WESTERN AND KEDZIE AVENUE LINES.

NO. 1 A.

South bound Western Ave. cars issue transfers, for cash fares or transfers to east or west bound 47th St. cars, 63d St. cars, and east bound 69th St. cars, and 59th St. cars at Leavitt St.

NO. 1 B.

South bound Western Ave. cars receive transfers from east or west bound Archer Ave. cars, 47th St. cars, 63d St. cars, and west bound 69th St. cars.

NO. 1 A.

North bound Western Ave. cars issue transfers, for cash fares or transfers, to east bound 69th St. and 59th St. cars, and to east or west bound 63d St. cars, 47th St. cars and Archer Ave. cars.

NO. 1 B.

North bound Western Ave. cars receive transfers from west bound 69th and 59th St. cars, and east or west bound 63d St. cars and 47th St. cars.

NO 2 A.

South bound Kedzie Ave. cars issue trasfers, for cash fares or transfers, to east bound 47th St. and to east or west bound 63d St. cars.

NO. 2 B.

South bound Kedzie Ave. cars receive transfers from 47th St. and 63d St. cars.

NO 2 A.

North bound Kedzie Ave. cars issue transfers to 47th St. cars and Archer Ave. cars.

NO. 2 B.

North bound Kedzie Ave. cars receive transfers from 63d and 47th St. cars.

SPECIAL.

Passengers may be transferred to the Western, Kedzie or Archer Limits line, via the Archer Ave. line, on "cash" transfers from the Ashland, 26th, 31st or 35th St. lines, and vice versa.

POINTS OF TRANSFER OF ARCHER AVENUE LINES.

NO. 1 A.

Southwest bound Archer Ave. cars issue transfers, for cash fares or transfers, to east bound 26th St. and 31st St. cars at Halsted St. and Pitney court, and south bound Throop St. cars, Ashland Ave. cars, Western Ave. cars and north and south bound Kedzie Ave. cars and west bound 38th St. cars at Campbell Ave., and east or west bound 35th St. cars, and to north or south bound Halsted St. cars for cash only. For transfers to West Side lines on Halsted see special transfer.

NO. 1 B.

Southwest bound Archer Ave. cars receive transfers from west bound 26th and 31st St. cars and north or south bound Halsted St. cars and Kedzie Ave. cars, and from north bound Throop St. cars, Ashland Ave. cars and Western Ave. cars, and from east or west bound 35th St. cars, and east bound 38th St. cars, and from Clark St. cars at Clark St.

NO. 1 A.

Northeast bound Archer Ave. cars issue transfers, for cash fares only, to north or south bound Kedzie Ave. cars; for cash fares or transfers to 38th St. cars west bound, Western Ave. cars south bound, east or west bound 35th St. cars, south bound Throop St. cars, and east bound 31st St. cars, 26th St. cars, and for cash only to south bound Halsted St. cars.

NO. 1 B.

Northeast bound Archer Ave. cars receive transfers from north or south bound Kedzie Ave. cars, north bound Western Ave. cars, east bound 38th St. cars, east or west bound 35th St. cars, west bound 31st St. cars and 26th St. cars.

SPECIAL.

Privilege is given passenger of transferring from 47th St. west on Archer. Transfers will not be issued on "special" transfers received from the "West Side"

Halsted St. line. "Special" transfers to the "West Side" Halsted line will be issued for cash fares. Transfers will not be issued on transfers received from the Halsted St. line. Transfers "south on Halsted at Archer" will be issued only for cash fares. Passengers may be transferred to the Archer Ave. line on "cash" transfers from the Ashland, 26th, 31st or 35th St. lines, and vice versa. Transfers may be issued from the 31st St. line on "cash" transfers from east bound Archer Ave. cars, the same as for cash fares. Passengers may receive transfers from the 38th St. Archer line to the Archer Limits line, and the same be counted as cash fares.

TRANSFER POINTS OF THE 69TH AND SOUTH CHICAGO AVENUE LINES.

NO. 1 A.

East bound 69th St. cars issue transfers for cash fares only to north bound Ashland Ave. cars, to north or south bound Wallace and Center Ave. cars, Halsted St. cars, Wentworth Ave. cars, State and Vincennes Ave. cars and Cottage Grove Ave. cars and to east bound South Chicago Ave. cars. See special transfer.

NO. 1 B.

East bound 69th St. cars receive transfers from north or south bound Western Ave. cars, south bound Ashland Ave. cars, north or south bound Wallace and Center Ave. cars, Halsted St. cars, Wentworth Ave. cars, State and Vincennes Ave. cars and Cottage Grove Ave. cars.

NO. 1 A.

West bound 69th St. cars issue transfers for cash fares only to north or south bound State and Vincennes Ave. cars, Wentworth Ave. cars, Halsted St. cars, Wallace and Center Ave. cars and Western Ave. cars, and to north bound Ashland Ave. cars. See special transfer.

NO. 1 B.

West bound 69th St. cars receive transfers from north or south bound Cottage Grove Ave. cars, State and Vincennes cars, Wentworth Ave. cars, Halsted St. cars, Wallace and Center Ave. cars, and from south bound Ashland Ave. cars, and from west bound South Chicago Ave. cars at Cottage Grove Ave.

NO. 2 A and B.

South Chicago Ave. cars issue and receive transfers at Cottage Grove Ave. from Cottage Grove Ave. cars, and issue and receive transfers from 69th St. cars via Cottage Grove Ave. line. See special transfer.

SPECIAL.

Passengers paying cash fares on north bound South Chicago Ave. cars are entitled to a transfer west on 69th St. via Cottage Grove Ave. cars, and to a second transfer north or south at the following intersecting north and south lines: Sate and Vincennes Ave., Wentworth Ave., Halsted St., Wallace and Center St., Ashland Ave. and Western Ave., and vice versa. Passengers holding "special" transfers from the West Side lines of the Chicago Union Traction Company to the Halsted St. are not entitled to further transfer.

TRANSFER POINTS OF THE STATE AND VINCENNES LINES.

NO. 1 A.

State and Vincennes cars issue transfers, for cash fares or transfers, to 69th, 63d, 61st and 59th St. cars in all directions, and north on State St. at 63d or south on Vincennes at 73d St.

NO. 1 B.

North and south bound State and Vincennes cars receive transfers from 69th and 63d St. cars east or west bound, and when north bound from north bound Wentworth Ave. cars at 73d St., and when south bound from State St. cars at 63d St.

SPECIAL.

Passengers may be transferred to the Cottage Grove Ave. line via 63d St. from north bound State and Vincennes cars and vice versa.

TRANSFER POINTS OF THE THROOP AND MORGAN STREET LINE.

NO. 1 A.

South bound Throop and Morgan St. cars issue transfers, for cash fares or transfers, to east or west bound 31st St. cars and 35th St. cars.

NO. 1 B.

South bound Throop and Morgan St. cars receive transfers from north and east or south and west bound Archer Ave. cars and from east or west bound 31st St. cars and 35th St. cars.

NO. 1 A.

North bound Throop and Morgan St. cars issue transfers, for cash fares or transfers, to east or west bound 35th and 31st St. cars, and to south or west bound Archer Ave. cars at Pitney court.

NO. 1 B.

North bound Throop and Morgan St. cars receive transfers from east or west bound 35th and 31st St. cars.

TRANSFER POINTS OF THE 63D STREET LINE.

NO. 1 A.

East bound Ashland Ave. 63d St. cars issue transfers, for cash fares only, to north and south bound Center Ave., Halsted St., Wentworth Ave., State St. and Cottage Grove Ave. cars. See special transfer.

NO. 1 B.

East bound Ashland Ave. 63d St. cars receive transfers from north or south bound Ashland Ave., Center Ave., Halsted St., Wentworth Ave., State St. and Cottage Grove Ave. cars. See special transfer.

NO. 1 A.

West bound Ashland Ave. 63d St. cars issue transfers, for cash fares only, to north or south bound Cottage Grove Ave., State St., Wentworth Ave., Halsted St., Center Ave. and Ashland Ave. cars. See special transfer.

NO. 1 B.

West bound Ashland Ave. 63d St. cars receive transfers from north or south bound Cottage Grove Ave., State St., Wentworth Ave., Halsted St. and Center Ave. cars. See special transfer.

NO 2 A.

East bound Central Ave. 63d St. cars issue transfers, for cash only, to north bound Kedzie Ave. cars and to north or south bound Western Ave. and Ashland Ave. cars. For transfers to Stony Island 63d St. cars see special transfer.

NO. 2 B.

East bound Central Ave. 63d St. cars receive transfers from south bound Kedzie Ave. cars and north or south bound Western Ave. cars.

NO 2 A.

West bound Central Ave. 63d St. cars issue transfers, for cash fares only, to north or south bound Western Ave. and north bound Kedzie Ave. cars.

NO. 2 B.

West bound Central Ave. 63d St. cars receive transfers from north or south bound Ashland Ave. cars, Western Ave. cars and south bound Kedzie Ave. cars and at Ashland Ave. from Stony Island 63d St. cars. See special transfer.

SPECIAL.

Passengers may be transferred to the State or Cottage Grove Ave. line, via the 63d St. line, on transfers from north bound cars of the Halsted, Wentworth and State St. lines, and vice versa. Passengers paying fare either in cash or transfer slips on the Ashland Ave. 63d St. cars will be transferred to the Central Ave. 63d St. cars at Ashland Ave., and transfers issued from the through cars on "cash" transfers from the Stony Island 63d St. cars, the same as for cash fares.

TRANSFER POINTS OF THE 39TH, 47TH, 51ST, 59TH AND 61ST LINES.

East or west bound 39th, 47th, 51st, 59th and 61st St. cars issue transfers, for cash fares only, and receive transfers from north or south bound cars on any intersecting north and south line; also the 47th St. cars west bound will issue transfers west on Archer Limits line at 47th or Kedzie Ave., and vice versa. Transfers will be issued east or west on 43d, 47th or 51st St. lines from Halsted or Indiana, or north on Halsted or Indiana at Root or 39th, or south on Halsted at 47th or 51st St., in exchange for cash or transfer.

TRANSFER POINTS OF THE 26TH, 31ST, AND 35TH STREET LINES.

East or west bound 26th, 31st and 35th St. cars issue transfers for cash fares only, and receive transfers from north or south bound cars on any intersecting

Transfers may be issued from the 31st St. line on "cash" transfers from east bound Archer Ave. cars, the same as for cash fares.

north and south line, or east or west bound cars on Archer Ave. at Halsted, Pitney and 35th Sts.

Transfers "west on Archer at Pitney" may be issued on transfers, by conductors of the 31st St. cars going west.

Transfers from the 26th St. line are receivable on the Archer or Ashland Ave. cars at Halsted, and transfers from the Archer or Ashland Ave. cars are receivable on the 26th St. cars at Halsted and 26th Sts. Passengers may be transferred to the Western, Kedzie or Archer Limits line, via Archer Ave. line, on "cash" transfers from the Ashland, 26th, 31st or 35th St. line. and vice versa.

APPENDIX F.

Schedule Showing Points at which Transfers are Issued and Received by the Chicago Union Traction Co.

TRANSFER POINTS ON LINES TERMINATING AT BELLE PLAINE STATION.

NO. 1 A.

South Bound Lincoln Ave. Electric cars issue transfers to south bound Southport Ave. cars and to cable cars at Cable Station.

NO. 1 B.

South bound Lincoln Ave. Electric cars receive transfers from south bound Southport Ave. cars.

NO. 1 A.

North bound Lincoln Ave. cars issue transfers to north bound Southport Ave. cars.

NO. 1 B.

North bound Lincoln Ave. cars receive transfers from Cable cars at Cable station and from north bound Southport Ave. cars.

No. 2 B.

South bound Sharpshooters Park cars issue transfers to Cable cars at Cable station. South bound Sharpshooters Park cars receive transfers from south bound Southport Ave. cars. North bound Sharpshooters Park cars issue transfers to north bound Southport Ave. cars. North bound Sharpshooters Park cars receive transfers from Cable cars at Cable station.

No. 3 A.

South bound Robey St. cars (C. C. T. Co.) issue transfers to Lincoln Ave. Cable cars at Cable station. South bound Robey St. cars receive transfers from south bound Southport Ave. cars. North bound Robey St. cars issue transfers to north bound Southport Ave. cars. North bound Robey St. cars receive transfers from Cable cars at Cable station.

TRASFER POINTS ON LINES TERMINATING AT BLUE ISLAND AVE. STATION.

NO. 1 A.

North bound Blue Island Ave. cars issue transfers to north bound Ashland Ave. cars, to east bound 21st Street cars, to north bound Center Ave. cars. *See special transfer.*

NO. 1 B.

North bound Blue Island Ave. cars receive transfers from east bound 26th St. cars, at Leavitt St., at 18th St., from east bound 21st St. cars, 18th St. cars, 14th St. cars, 12th St. cars, and Taylor St. cars. *See special transfer.*

NO. 1 A.

South bound Blue Island Ave. cars issue transfers to west bound Taylor St. cars, 12th St. cars, 14th St. cars, 18th St. cars, 21st St. cars, and to 26th St. cars, at Leavitt St. *See special transfer.*

NO. 1 B.

South bound Blue Island Ave. cars receive transfers from south bound Center Ave. cars, and from south bound Ashland Ave. cars.

NO. 2 A.

Canal and 21st St. cars issue transfers to north or south bound Western Ave. cars, Ashland Ave. cars, S. Halsted St. Cable cars, to north bound Blue Island Ave. cars, Center Ave. cars, west on 12th St. cars at Canal and 12th St. when east bound.

NO. 2 B.

East bound Canal and 21st St. cars receive transfers from north or south bound Western Ave. cars, Ashland Ave. cars, from north bound Blue Island Ave. cars, from south bound Center Ave. cars, and from north bound S. Halsted St. Cable cars.

NO. 2 A.

West bound Canal and 21st St. cars issue transfers to south bound S. Halsted St. Cable cars, to north bound Center Ave. cars, to north or south bound Ashland Ave. cars, Western Ave. cars.

NO. 2 B.

West bound Canal and 21st St. cars receive transfers from east bound 12th St. cars, from south bound Center Ave. cars, and Blue Island Ave. cars, from north or south bound S. Halsted St. Cable cars, Ashland Ave. cars, and Western Ave. cars.

NO. 3 A.

West bound 18th and 26th St. cars issue transfers to north or south bound S. Halsted St. Cable cars, Center Ave. cars, Ashland Ave. cars.

NO. 3 B.

West bound 18th and 26th St. cars receive transfers from north or south bound S. Halsted St. Cable cars, Center Ave. cars, Ashland Ave. cars, from south bound Blue Island Ave. cars, at 18th St. and at Leavitt St., and from south bound Western Ave. cars.

NO. 3 A.

East bound 18th and 26th St. cars issue transfers to north bound Western Ave. cars at 26th St. to north bound Blue Island Ave. cars at Leavitt St. and 18th St., to north or south bound Ashland Ave. cars, Center Ave. cars, S. Halsted St. Cable cars.

NO. 3 B.

East bound 18th and 26th St. cars receive transfers from north or south bound Ashland Ave. cars, Center Ave. cars. S. Halsted St. Cable cars.

SPECIAL.

East bound Blue Island Ave. cars issue transfers to north bound Halsted St. Electric cars, entitling the passenger to a ride as far north as Madison St. and to an additional transfer east on Madison St. Southwest bound Blue Island Ave. cars receive transfers from south bound Halsted St. Electric cars. Halsted St. conductors issue transfers at this point providing passenger boards at or south of Madison St. paying a cash fare or a transfer.

TRANSFER POINTS ON LINES TERMINATING AT CICERO AND PROVISO STATION.

NO. 1 A.

West bound Madison St. cars issue transfers to south bound 48th Ave. cars good to end of line, to north bound 48th Ave. cars good to Lake St. only, to north bound Chicago Ave. cars at Harlem Ave. and Madison St. transfers good to Pine Ave. and Chicago Ave., to south bound Chicago Ave. cars at Desplaines Ave. and Madison St. transfers good to 12th St.

NO. 1 B.

West bound Madison St. cars receive transfers from north or south bound 48th Ave. cars at 48th Ave. and Madison St. from east or west bound Chicago Ave. cars at Madison and Desplaines Ave.

NO. 1 A.

East bound Madison St. cars issue transfers south on Desplaines Ave. transfers good to 12th St., north on Harlem Ave., north on 48th Ave. to Lake St. only and south on 48th Ave. to end of line.

NO. 1 B.

East bound Madison St. cars receive transfers from east or west bound Chicago Ave. cars at Harlem Ave. and Madison St. and from north or south bound 48th Ave. cars at 48th Ave and Madison St.

NO. 2 A.

West bound Chicago Ave. cars issue transfers to west bound Lake St. cars at Harlem Ave. and Lake St., to east bound Lake St. cars at Harlem Ave. and Lake St. transfers good to 52d St. only, to east bound Madison St. cars at Harlem and Madison St. and to west bound Madison St. cars at Desplaines Ave. and Madison St.

NO. 2 B.

West bound Chicago Ave. cars receive transfers from west bound Lake St. cars and from north bound 48th Ave. cars at 48th Ave. and Lake St., from east and west bound Lake St. cars at Harlem Ave. and Lake St., from east and west bound Madison St. cars at Madison St. and Desplaines Ave.

NO. 2 A.

East bound Chicago Ave. cars issue transfers to west bound Madison St. cars at Desplaines Ave. and Madison St., to east bound Madison St. cars at Harlem Ave. and Madison St. to west bound Lake St. cars good to Maywood, to east bound Lake St. cars good to 52d St. only, and south on 48th Ave. at Lake and 48th Ave.

NO. 2 B.

East bound Chicago Ave. cars receive transfers from east or west bound Madison St. cars at Harlem Ave. and Madison St., and from east and west bound Lake St. cars at Lake St. and Harlem Ave.

NO. 3 A

West bound Lake St. cars issue transfers to south bound 48th Ave. cars at 48th and Madison St., to north bound Chicago Ave. cars at Lake and 48th, to south bound Chicago Ave. cars at Harlem Ave. and Lake St., to north bound Chicago Ave. cars at Harlem Ave. and Lake St., transfer good for ride east to Pine Ave. and Chicago Ave.

NO. 3 B.

West bound Lake St. cars receive transfers from north bound 48th Ave. cars at 48th and Lake St., from south bound Chicago Ave. cars at Harlem Ave. and Lake St.

NO. 3 A.

East bound Lake St. cars issue transfers to north or south bound Chicago Ave. cars at Harlem Ave. and Lake St., to south bound 48th Ave. cars at 48th Ave. and Lake St. or 48th Ave. and Madison St.

NO. 3 B.

East bound Lake St. cars receive transfers from north or south bound Chicago Ave. cars at Harlem Ave. and Lake St., from south bound Chicago Ave. cars at 48th Ave and Lake St., and from north bound 48th Ave. cars at Madison St. and 48th Avenue.

TRANSFER POINTS ON LINES TERMINATING AT CLYBOURN STATION.

NO. 1 A.

South bound Clybourn Ave. cars issue transfers to west bound Division St. cars, and Chicago Ave. cars and to east or west bound North Ave. cars.

NO. 1 B.

South bound Clybourn Ave. cars receive transfers from south bound Southport Ave. cars, from east or west bound North Ave. cars, from east bound Division St. cars, Chicago Ave. cars and from south bound Halsted and 21st St. cars and from Clybourn Ave. Electric cars at Cable station.

NO. 2 A.

North bound Clybourn Ave. cars issue transfers to west bound Chicago Ave. cars, Division St. cars and to east or west bound North Ave. cars and to electric cars north of cable station, to north bound Halsted St. cars and to north bound Southport Ave. cars.

NO. 2 B.

North bound Clybourn Ave. cars receive transfers from east bound Chicago Ave. cars from east or west bound North Ave. cars.

TRANSFER POINTS ON LINES TERMINATING AT DEVON AVE. STATION.

NO. 1 A.

South bound Halsted and 21st St. cars issue transfers to west bound Fullerton Ave. cars, Garfield Ave. cars, to east bound North Ave. cars and to south bound Clybourn Ave. Cable cars. *See special transfer.*

NO. 1 B.

South bound Halsted and 21st St. cars transfer from N. Halsted Street Extension from south bound Lincoln Ave. cars, and from the Fullerton-Van Buren cars at Van Buren St.

NO. 1 A.

North bound Halsted and 21st St. cars issue transfers to north bound Lincoln Ave. Cable cars and to Halsted St. Extension. *See special transfer.*

NO. 1 B.

North bound Halsted St. cars receive transfers from west bound North Ave. cars, from east bound Sedgwick St. cars, from east bound Fullerton Ave. cars and from north bound Clybourn Ave. cars.

NO. 2 A.

South bound Clark St. electric cars issue transfers to Southport Ave. cars, Sheffield Ave. cars and Limits Cable cars. Also accept transfers from same lines when north bound.

NO. 3 A.

South bound Sheffield Ave. cars issue transfers to Lincoln Ave. Cable cars.

NO. 3 B.

South bound Sheffield Ave. cars receive transfers from south bound Clark St. Electric cars.

NO. 3 A.

North bound Sheffield Ave. cars issue transfers to north bound Clark St. cars.

NO. 3 B.

North bound Sheffield Ave. cars receive transfers from Lincoln Ave. Cable cars at Cable station.

NO. 4 A.

South bound Evanston Ave. cars issue transfers to Cable cars at Cable station. When north bound accept transfers from Cable cars at Cable station.

NO. 5 A.

South bound Ashland Ave. cars issue transfers to Lincoln Ave. Cable cars at Cable station.

NO. 5 B.

South bound Ashland Ave. cars receive transfers from south bound Southport Ave. cars.

NO. 5 A.

North bound Ashland Ave. cars issue transfers to north bound Southport Ave. cars.

NO. 5 B.

North bound Ashland Ave. cars receive transfers from Lincoln Ave. Cable cars at Cable station.

NO. 6 A.

South bound Fullerton-Van Buren St. cars issue transfers to east bound North Ave. cars, south bound Clybourn Ave. cars, and to Halsted and 21st St. cars at Van Buren St.

NO. 6 B.

South bound Fullerton-Van Buren St. cars receive transfers from south bound Lincoln Ave. cars.

NO. 6 A.

North bound Fullerton-Van Buren St. cars issue transfers to north bound Lincoln Ave. cars.

NO. 6 B.

North bound Fullerton-Van Buren St. cars receive transfers from north bound Clybourn Ave. cars.

NO. 7 A.

South bound Southport Ave. cars issue transfers to south bound Lincoln Ave. cars, and to south bound Clybourn Ave. cars.

NO. 7 B.

South bound Southport Ave. cars receive transfers from Clark St. cars and from Gross Park cars south bound.

NO. 7 A.

North bound Southport Ave. cars issue transfers to north bound Gross Park cars at Lincoln Ave. and to north bound Clark St. cars.

NO. 7 B.

North bound Southport Ave. cars receive transfers from north bound Clybourn Ave. cars and Lincoln Ave. cars.

NO. 8 A.

Passengers boarding Evanston cars at or south of Graceland Ave. are entitled to transfers on Halsted and 21st St. cars and to Limits Cable cars at Cable station.

NO. 8 B.

Passengers boarding Evanston cars at Limits Cable station with transfers from Cable cars are entitled to ride as far as Graceland Ave. without paying another fare, same privilege extended to patrons of Halsted St. cars wishing to go farther north than Clark St. and not beyond Graceland Ave.

SPECIAL.

South bound Halsted St. cars receive transfers from south bound Milwaukee Ave. cars and issue a transfer east on Madison St. on either a cash fare or a transfer. Passenger boarding south bound Halsted St. Electric car at or south of Madison St., paying cash fare or transfer, is entitled to a transfer south on Blue Island Ave. North bound Halsted St. cars receive transfers from Blue Island Ave., entitling passenger to a ride as far north as Madison St. and to a transfer east on Madison St. Passenger boarding Halsted St. car at or north of Madison St., paying cash fare or transfer, is entitled to a transfer north on Milwaukee Ave. or a ride as far north as Halsted St. and Graceland Ave.

TRANSFER POINTS ON LINES TERMINATING AT DIVISION ST. STATION.

NO. 1 A.

East bound W. Chicago Ave. cars issue transfers to north or south bound California Ave. cars, transfers accepted at Kedzie Ave. and at California Ave., to north or south bound Western Ave. cars, Robey St. cars, Paulina St. cars, to east bound North Side Chicago Ave. cars, at California Ave., to south bound Desplaines and Clinton cars at Milwaukee Ave., and to south bound Grand Ave. cars.

NO. 1 B.

East bound W. Chicago Ave. cars receive transfers from north or south bound Kedzie and California Ave. cars, transfers accepted at Kedzie Ave. and at California Ave., from north or south bound Western Ave. cars, Robey St. cars, Ashland Ave. cars, and from east bound North Side Chicago Ave. cars at Milwaukee Ave.

NO. 1 A.

West bound W. Chicago Ave. cars issue transfers to north or south bound Kedzie and California Ave. cars, transfers accepted at Kedzie Ave. and at California Ave. to north or south bound Western Ave. cars, Robey St cars, and Ashland Ave. cars.

NO. 1 B.

West bound W. Chicago Ave. cars receive transfers from north or south bound Kedzie and California Ave. cars, transfers accepted at California Ave. and at Kedzie Ave., from north or south bound Western Ave. cars, Robey St. cars, Ashland Ave. cars from west bound North Side Chicago Ave. cars at Milwaukee Ave. from north bound Desplaines and Clinton cars at Milwaukee Ave. and from north bound Grand Ave. cars.

NO. 2 A.

East bound West Division St. cars issue transfers to north or south bound California and Kedzie Ave. cars, to north or south bound Western Ave. cars, Robey St. cars, Ashland Ave. cars, to south bound Desplaines and Clinton cars at Noble St.

NO. 2 B.

East bound W. Division St. cars receive transfers from north or south bound California Ave. cars, Western Ave. cars, Robey St. cars, Ashland Ave. cars, from east bound North Side Division St. cars at Milwaukee Ave., and from East bound North Side Chicago Ave. cars at Milwaukee Ave.

NO. 2 A.

West bound W. Division St. cars issue transfers to north or south bound Ashland Ave. cars, Robey St. cars, Western Ave. cars, and California Ave. cars.

NO. 2 B.

West bound W. Division St. cars receive transfers from north bound Desplaines and Clinton cars at Milwaukee Ave. from north bound Milwaukee Ave. Cable cars, from north or south bound Ashland Ave. cars, Robey St. cars, and Western Ave. cars and from west bound W. Chicago Ave. cars at Milwaukee Ave.

TRANSFER POINTS ON LINES TERMINATING AT ELSTON AVE. STATION.

NO. 1 A.

North bound Elston Ave. cars issue transfers to east or west bound Belmont Ave. cars and to the Crawford Ave. Extension.

NO. 1 B.

North bound Elston Ave. cars receive transfers from east or west bound Belmont Ave. cars.

NO. 1 A.

South bound Elston Ave. cars issue transfers to east or west bound Belmont Ave. cars.

NO. 1 B.

South bound Elston Ave. cars receive transfers from Crawford Ave. Extension and from east or west bound Belmont Ave. cars.

NO. 2 A.

West bound Belmont Ave. cars issue transfers to north or south bound Elston Ave. cars.

NO. 2 B.

West bound Belmont Ave. cars receive transfers from north or south bound Elston Ave. cars.

NO. 2 A.

East bound Belmont Ave. cars issue transfers to north or south bound Elston Ave. cars.

NO. 2 B.

East bound Belmont Ave. cars receive transfers from north or south bound Elston Ave. cars.

NO. 3 A.

Crawford Ave. cars receive and issue transfers to and from Elston Ave. cars.

TRANSFER POINTS ON LINES TERMINATING AT S. HALSTED ST. STATION.

NO. 1 A.

North bound S. Halsted St. Cable care issue transfers to east or west bound Canalport Ave. cars, 18th St. cars, to west bound 14th St. cars, 14th St. cars, Taylor St. cars, Harrison St. cars and Van Buren St. cars.

NO. 1 B.

North bound S. Halsted St. Cable cars receive transfers from Chicago City Ry. Co. cars at Cable station, from east bound Canalport Ave. cars, from east or west bound 18th St. cars, from east bound 14th St. cars and 12th St. cars, from east or west bound Taylor St. cars.

NO. 1 A.

South bound S. Halsted St. Cable cars issue transfers to west bound Taylor St. cars, 12th St. cars, 14th St. cars, to east or west bound 18th St. cars, to west bound Canalport Ave. cars.

NO. 1 B.

South bound S. Halsted St. Cable cars receive transfers from east bound Van Buren St. cars, Harrison St. cars, from east or west bound Taylor St. cars, from east bound 12th St. cars, from east or west bound 14th St. cars, 18th St. cars, and from east bound Canalport Ave. cars.

TRANSFER POINTS ON LINES TERMINATING AT KEDZIE AVE. STATION.

NO. 1 A.

East bound Van Buren St. cars issue transfers to north or south bound Western Ave. cars, Robey St. cars, Paulina St. cars, Center Ave. cars, and to south bound S. Halsted St. Cable cars.

East bound Van Buren St. cars receive transfers from north or south bound Kedzie Ave. cars, Western Ave. cars, Robey St. cars, Paulina St. cars, Center Ave. cars, and from east bound Ogden Ave. cars.

NO. 1 A.

West bound Van Buren St. cars issue transfers to north or south bound Kedzie Ave. cars, Western Ave. cars, Robey St. cars, Paulina St. cars, Center Ave. cars, and to west bound Ogden Ave. cars.

NO. 1 B.

West bound Van Buren St. cars receive transfers from north or south bound Western Ave. cars, Robey St. cars, Paulina St. cars, Center Ave. cars, and from north bound S. Halsted St. Cable cars.

NO. 2 A.

East bound Harrison St. cars issue transfers to north or south bound Western Ave. cars, Robey St. cars, Paulina St. cars, Center Ave. cars, and to south bound S. Halsted St. Cable cars.

NO. 2 B.

East bound Harrison St. cars receive transfers from north or south bound Kedzie Ave. cars, Western Ave. cars, Robey St. cars, Paulina St. cars and Center Ave. cars.

NO. 2 A.

West bound Harrison St. cars issue transfers to north or south bound Kedzie Ave. cars, Western Ave. cars, Robey St. cars, Paulina St. cars and Center Ave. cars.

NO. 2 B.

West bound Harrison St. cars receive transfers from north or south bound Western Ave. cars, Robey St. cars, Paulina St. cars, Center Ave. cars, and from north bound S. Halsted St. Cable cars.

NO. 3 A.

East bound Colorado Ave. cars issue transfers to north or south bound California Ave. cars and to east bound Madison St. cars.

NO. 3 B.

East bound Colorado Ave. cars receive transfers from north or south bound Kedzie Ave. cars.

NO. 3 A.

West bound Colorado Ave. cars issue transfers to north or south bound Kedzie Ave. cars.

NO. 3 B.

West bound Colorado Ave. cars receive transfers from west bound Madison St. cars and from north or south bound Kedzie Ave. cars.

NO. 4 A.

South bound Kedzie Ave. cars issue transfers to east or west bound 12th St. cars, Colorado Ave. cars, Madison St. cars, Lake St. cars, Chicago Ave. cars, Grand Ave. cars, North Ave. cars, Armitage Ave. cars, to east bound Harrison St. cars, Van Buren St. cars, Division St. cars, Fullerton Ave. cars, and to east and west bound Desplaines and Clinton cars at North Ave.

NO. 4 B.

South bound Kedzie Ave. cars receive transfers from east or west bound Colorado Ave. cars, Madison St. cars, Lake St. cars, Chicago Ave. cars, Grand Ave. cars, North Ave. cars, Armitage Ave. cars, Fullerton Ave. cars, Division St. cars. On the Division St. cars and on the Chicago Ave. cars transfers are good on both north and west side lines. Also receive transfers from Harrison St. and Van Buren St. cars and from east and west bound Desplaines and Clinton cars.

NO. 4 A.

North bound Kedzie Ave. cars issue transfers to east and west bound 12th St. cars, Colorado Ave cars, Madison St. cars, Lake St. cars, Chicago Ave. cars, Grand Ave. cars, North Ave. cars, Armitage Ave. cars, to east bound Harrison St. cars, Van Buren St. cars, Division St. cars, Fullerton Ave. cars and to east and west bound Desplaines and Clinton cars at North Ave.

NO. 4 B.

North bound Kedzie Ave. cars receive transfers from east or west bound Colorado Ave. cars, Madison St. cars, Lake St. cars, Chicago Ave. cars, Grand Ave. cars, North Ave. cars, Armitage Ave. cars. Fullerton Ave. cars, Division St. cars. On the Division St. cars and on the Chicago Ave. cars transfers are good on both north and west side lines. Also receive transfers from Harrison St. and Van Buren St. cars and from east and west bound Desplaines and Clinton cars. North bound Kedzie Ave. cars receive transfers from east and west bound 12th St. cars.

TRANSFER POINTS ON LINES TERMINATING AT LARRABEE ST. STATION.

NO. 1 A.

West bound North Ave. cars issue transfers to north or south bound Wells St. cars, Sedgwick St. cars, Larrabee St. cars, Clybourn Ave. cars, Ashland Ave. cars, Robey St. cars, Western Ave. cars, California Ave. cars and to north bound Halsted St. cars

NO. 1 B.

West bound North Ave. cars receive transfers from north or south bound California Ave. cars, Western Ave. cars, Robey St. cars, Ashland Ave. cars, Clybourn Ave. cars, Larrabee St. cars, Sedgwick St. cars, Wells St. cars, Clark St. cars, and from north bound Milwaukee Ave. cars.

NO. 1 A.

East bound North Ave. cars issue transfers to north or south bound California Ave. cars, Western Ave. cars, Robey St. cars, Ashland Ave. cars, Clybourn Ave. cars, Larrabee St. cars, Sedgwick St. cars, Wells St. cars, Clark St. cars, and to south bound Milwaukee Ave. cars. Passnegers presenting transfers from California Ave. cars and Western Ave. cars are entitled to transfers south on Milwaukee Ave. Passengers presenting transfers from Milwaukee Ave. cars to west bound North Ave. cars are entitled to transfers north or south on Western Ave. cars and California Ave. cars.

NO. 1 B.

East bound North Ave. cars receive transfers from north or south bound California Ave. cars, Western Ave. cars, Robey St. cars, Ashland Ave. cars, Clybourn Ave. cars, Larrabee St. cars, Sedgwick St. cars and from south bound Halsted St. cars.

NO. 2 A.

West bound Chicago Ave. cars issue transfers to north or south bound Wells St. cars, Ashland Ave. cars, Robey St. cars. Western Ave. cars, California Ave. cars and west on Chicago Ave. at Milwaukee Ave.

NO. 2 B.

West bound Chicago Ave. cars receive transfers from north bound Milwaukee Ave. cars, from north bound Desplaines and Clinton cars at Milwaukee Ave., from north or south bound Ashland Ave. cars, Robey St. cars, Western Ave. cars, from north bound Division St. cars at Milwaukee Ave., from north and south bound Wells St. Cable cars, and from north and south bound Clybourn Ave. cars.

NO. 2 A.

East bound Chicago Ave. cars issue transfers to north or south bound Ashland Ave. cars, Robey St. cars, Western Ave. cars and to south bound west side

Chicago Ave. cars, to south bound Milwaukee Ave. Cable cars, to Desplaines and Clinton cars and Division St. cars at Milwaukee Ave. and north or south bound Wells St., Lincoln, Limits and Clybourn Ave. Cable cars.

NO. 2 B.

East bound Chicago Ave. cars receive transfers from north or south bound Ashland Ave. cars, Robey St. cars, Western Ave. cars, California Ave. cars and from east bound west side Chicago Ave. cars at California Ave.

NO. 3 A.

North bound Larrabee St. cars issue transfers to east or west bound North Ave. cars, to north bound Lincoln Ave. cars and to west bound Fullerton Ave. cars.

NO. 3 A.

South bound Larrabee St. cars issue transfers to south bound Lincoln Ave. cars, and from east or west bound North Ave. cars.

NO. 3 B.

South bound Larrabee St. cars receive transfers from south bound Lincoln cars, and to east or west bound North Ave. cars.

NO. 4 A.

North bound Sedgwick St. cars issue transfers to east or west bound North Ave. cars and to Lincoln Ave. Cable cars.

NO. 4 B.

North bound Sedgwick St. cars receive transfers from east or west bound North Ave. cars, from north bound Lincoln Ave. cars, from south bound Halsted St. cars, and from east bound Division St. cars at Sedgwick and Division St.

NO. 4 A.

South bound Sedgwick St. cars issue transfers to north bound Halsted St. cars, to south bound Lincoln Ave. cars, to east or west bound North Ave. cars, and to west bound Division St. cars.

NO. 4 B.

South bound Sedgwick St. cars receive transfers from south bound Lincoln Ave. cars, from east or west bound North Ave. cars and from east bound Division St. cars.

NO. 5 A.

State St. cars issue transfers to Clark St. cars at Division and Clark St.; also receive transfers from Clark St. cars at same point.

NO. 6 A.

South bound Clybourn Ave. Electric cars issue transfers to east or west bound Fullerton Ave. cars and to Clybourn Ave. Cable cars at Cable station.

NO. 6 B.

North bound Clybourn Ave. Electric cars receive transfers from Clybourn Ave. Cable cars and from either east or west Fullerton Ave. cars.

NO. 7 A.

East bound Fullerton Ave. cars issue transfers to south bound Robey St. cars, to north bound Clybourne Ave. cars, to south bound Lincoln Ave. cars, to north bound Halsted St. cars, to north or south bound California Ave. cars.

NO. 7 B.

East bound Fullerton Ave. cars receive transfers from north bound Robey St. cars, and from south bound Clybourne Ave. cars, from north or south bound California Ave. cars.

NO. 7 A.

West bound Fullerton Ave. cars issue transfers to Robey St. cars, to north bound Clybourn Ave. cars, and to north or south bound California Ave. cars.

NO. 7 B.

West bound Fullerton Ave. cars receive transfers from north bound Lincoln Ave. cars, Larrabee St. cars, from south bound Halsted St. cars, and from north bound Robey St. cars and from south bound Clybourn Ave. cars.

NO. 8 A.

West bound Division St. cars issue transfers to north or south bound Ashland Ave. cars, Robey St. cars, Western Ave. cars and California Ave. cars.

NO. 8 B.

West bound Division St. cars receive transfers from north or south bound Ashland Ave. cars, Robey St. cars, Western Ave. cars, California Ave. cars, Sedgwick St. cars and from north and south bound Clybourn Ave. and from north bound Milwaukee Ave. cars.

NO. 8 A.

East bound Division St. cars issue transfers to north or south bound Western Ave. cars, Robey St. cars, Ashland Ave. cars, to south bound Milwaukee Ave. cars, Clybourne Ave. cars and to north or south bound Sedgwick Ave. cars.

NO. 8 B.

East bound Division St. cars receive transfers from north or south bound Ashland Ave. cars, Robey St. cars, Western Ave. cars and California Ave. cars.

TRANSFER POINTS ON LINES TERMINATING AT LIMITS STATION.

NO. 1 A.

South bound Clark-Limits cars issue transfers to west bound North Ave. cars, to State St. cars at Clark and Division St. and to west bound Indiana St. cars.

NO. 1 B.

South bound Clark-Limits cars receive transfers from lines north of Cable station and from North Ave. cars.

NO. 1 A.

North bound Clark-Limits cars issue transfers to west bound North Ave. cars and to lines north of Cable station.

NO. 1 B.

North bound Clark-Limits cars receive transfers from east bound Indiana St. cars, from State St. cars at Clark and Division St. and from North Ave. cars.

NO. 2 A.

South bound Wells-Limits cars issue transfers to west bound North Ave. cars and Chicago Ave. cars.

NO. 2 B.

South bound Wells-Limits cars receive transfers from lines north of Cable station and from east bound North Ave. and Chicago Ave. cars.

NO. 2 A.

North bound Wells-Limits cars issue transfers to west bound Chicago Ave. cars, and North Ave. cars and to lines north of Cable station.

NO. 2 B.

North bound Wells-Limits cars receive transfers from east bound Chicago Ave. cars and North Ave. cars.

TRANSFER POINTS ON LINES TERMINATING AT LINCOLN AVE. STATION.

NO. 1 A.

South bound Clark-Lincoln Ave. cars issue transfers to south bound Halsted St. cars, Larrabee St. cars, Sedgwick St. cars, to North Ave. cars, to State St. cars at Clark and Division St. and to west bound Indiana St. cars.

NO. 1 B.

South bound Clark-Lincoln Ave. cars receive transfers from cars north of Cable station, at Fullerton Ave. from east bound Larrabee St. cars, at Webster Ave., from east bound Sedgwick St. cars and from North Ave. cars.

NO 1 A.

North bound Clark-Lincoln Ave. cars issue transfers to North Ave. cars, to west bound Sedgwick St. cars at Garfield Ave., to west bound Larrabee St. cars and W. Fullerton Ave., and to lines north of Cable station.

NO. 1 B.

North bound Clark-Lincoln cars receive transfers from east bound Indiana St. cars, from State St. cars at Clark and Division St., from North Ave. cars, from Sedgwick St. cars at Garfield Ave., from Larrabee St. cars at Lincoln Ave. and Larrabee St., from north bound Halsted St. cars at Fullerton Ave.

NO. 2 A.

South bound Wells-Lincoln Ave. cars issue transfers to south bound Halsted St. cars, Larrabee St. cars, Sedgwick St. cars, to west bound North Ave. and Chicago Ave. cars.

NO. 2 B.

South bound Wells-Lincoln Ave. cars receive transfers from lines north of Cable station, from Fullerton Ave. cars, Larrabeet St. cars, Sedgwick St. cars, from east bound North Ave. cars, and from east bound Chicago Ave. cars.

NO. 2 A.

North bound Wells-Lincoln Ave. cars issue transfers to west bound Chicago Ave. cars, North Ave. cars, to Sedgwick St. cars, to Larrabee St. and W. Fullerton Ave. cars and to lines north of Cable station.

NO. 2 B.

North bound Lincoln-Wells cars receive transfers from east bound Chicago Ave. cars, North Ave. cars, from north bound Sedgwick St. cars, Larrabee St. cars and Halsted St. cars.

TRANSFER POINTS ON LINES TERMINATING AT LAWNDALE STATION.

NO. 1 A.

West bound Ogden Ave. cars issue transfers to north or south bound Center Ave. cars, to south bound Robey St. cars, to west bound 12th St. cars, to south bound Western Ave. cars, and to north bound 40th Ave. cars.

NO. 1 B.

West bound Ogden Ave. cars receive transfers from north or south bound Center Ave. cars, from west bound Madison St. cars, from south bound Ashland Ave. cars, from south bound Robey St. cars, from west bound Van Buren St. cars, from north or south bound Western Ave. cars, and from west bound 12th St. cars.

NO. 1 A.

East bound Ogden Ave. cars issue transfers to north or south bound Western Ave. cars, to east bound 12th St. cars, to north bound Robey St. cars, to east bound Van Buren St. cars, to north or south bound Ashland Ave. cars, to east bound Madison St. cars, and to north or south bound Center Ave. cars.

NO. 1 B.

East bound Ogden Ave. cars receive transfers from 40th Ave. cars, from north or south bound Western Ave. cars, from west bound 12th St. cars, from north bound Robey St. cars, from north or south bound Paulina St. cars and Sangaman St. cars.

NO. 2 A.

West bound 12th St. cars issue transfers to west bound 14th St. cars, to north or south bound Center Ave. cars, Ashland Ave. cars, Robey St. cars, to south bound Ogden Ave. cars, to north or south bound Western Ave. cars, to north bound Kedzie Ave. cars, and to south bound 40th Ave. cars.

NO. 2 B.

West bound 12th St. cars receive transfers from west bound 14th St. cars, from north bound Canal St. cars, from north or south bound S. Halsted St. Cable cars, from South bound Blue Island Ave. cars, from north or south bound Center Ave. cars, Ashland Ave. cars, Robey St. cars, from west bound Ogden Ave. cars, from north or south bound Western Ave. cars and from south bound Kedzie Ave. cars.

NO. 2 A.

East bound 12th St. cars issue transfers to north bound Kedzie Ave. cars, to north or south bound Western Ave. cars, to north bound Ogden Ave. cars, to north or south bound Robey St. cars, Ashland Ave. cars, Center Ave. cars, to north bound Blue Island Ave. cars, to north or south bound S. Halsted St. Cable cars, to south bound Canal St. cars, to east bound 14th St. cars.

NO. 2 B.

East bound 12th St. cars receive transfers from 40th Ave. cars, from Kedzie Ave. cars, from north or south bound Western Ave. cars, from north bound Ogden Ave. cars, from north or south bound Robey St. cars, Ashland Ave. cars, Center Ave. cars, and from east bound 14th St. cars.

NO. 3 A.

North bound 40th Ave. cars issue transfers to east bound 12th St. cars, south bound 40th Ave. cars issue transfers east on Ogden Ave., also receive transfers from west bound 12th St. cars, and receive transfers from Ogden cars.

NO. 4 A.

West bound 14th St. cars issue transfers to west bound 12th St. cars, to north or south bound S. Halsted St. Cable cars, Center Ave. cars, Ashland Ave. cars, to north bound Robey St. cars.

NO. 4 B.

West bound 14th St. cars receive transfers from west bound 12th St. cars, from north or south bound S. Halsted St. Cable cars, Center Ave. cars, from south bound Blue Island Ave. cars, from north or south bound Ashland Ave. cars.

NO. 4 A.

East bound 14th St. cars issue transfers to north or south bound Ashland Ave. cars, Center Ave. cars, to north bound Blue Island Ave. cars, to north or south bound S. Halsted St. Cable cars, to east bound 12th St. cars.

NO. 4 B.

East bound 14th St. cars receive transfers from Robey St. cars, from north or south bound Ashland Ave. cars, Center Ave. cars, from north bound Blue Island Ave. cars, from north or south bound S. Halsted St. Cable cars, from east bound 12th St. cars.

TRANSFER POINTS OF LINES OF C. C. T. CO. TERMINATING AT LAWNDALE STATION.

NO. 5 A.

West bound 12th St. cars issue transfers north or south on 48th Ave.

NO. 5 B.

West bound 12th St. cars receive transfers from north or south bound 48th Ave. cars.

NO. 5 A.

East bound 12th St. cars issue transfers to north or south bound 48th Ave. cars. East bound 12th St. cars receive transfers from north or south bound 48th Ave. cars.

NO. 6 A.

West bound Berwvn cars issue transfers to north or south bound 48th Ave. cars.

NO. 6 B.

West bound Berwyn cars receive transfers from north or south bound 48th Ave. cars.

NO. 6 A.

East bound Berwyn cars issue transfers to north or south bound 48th Ave. cars.

NO. 6 B.

East bound Berwyn cars receive transfers from north or south bound 48th Ave. cars.

NO. 7 A.

South bound 48th Ave. cars issue transfers to east or west bound Madison St. cars, 12th St. cars, and to east or west bound Berwyn cars.

NO. 7 B.

South bound 48th Ave. cars receive transfers from Chicago Ave. cars at Lake and 48th Ave. and from east bound Lake St. cars at same point, from east or west bound Madison St., 12th St. cars and Berwyn cars, and from west bound Lake St. cars at 48th Ave. and Madison St.

NO. 7 A.

North bound 48th Ave. cars issue transfers to east or west bound Berwyn cars, 12th St. cars and Madison St. cars, to west bound Lake St. cars at Lake and 48th Ave., to north bound Chicago Ave. cars at same point and to east bound Lake St. cars and Madison and 48th Ave.

NO. 7 B.

North bound 48th Ave. cars receive transfers from east or west bound Berwyn cars, 12th St. cars and Madison St. cars to Lake St. only.

TRANSFER POINTS ON LINES TERMINATING AT MADISON AND 40TH ST. STATION.

NO. 1 A.

East or west bound Madison St. cars issue transfers to north or south bound Sangamon St. cars, Paulina St. cars, Robey St. cars, Western Ave. cars and Kedzie Ave. cars. West bound Madison St. cars issue transfers to west bound Ogden and Colorado Ave. cars.

SPECIAL.

East bound Madison St. cars receive transfers from north or south bound Halsted St. cars, west bound Madison St. cars issue transfers to north or south Halsted St. cars.

NO. 1 B.

East and west bound Madison St. cars receive transfers from north or south bound Sangamon St. cars, Paulina St. cars, Robey St. cars, Western Ave. cars, and Kedzie Ave. cars. When east bound receive transfers from east bound Ogden Ave. and Colorado Ave. cars.

TRANSFER POINTS ON LINES TERMINATING AT MILWAUKEE AVE. STATION.

NO. 1 A.

North bound Milwaukee Ave. cars issue transfers to west bound Armitage Ave. cars, to Milwaukee Ave. Ex., to north bound Western Ave. cars, to west bound North Ave. cars, to north bound Robey St. cars, to west bound Desplaines and Clinton cars, at Noble St., to west bound Desplaines and Clinton cars at North Ave., to west bound North and west side Division and Chicago Ave. cars. *See special.*

NO. 1 B.

South bound Milwaukee Ave. cars receive transfers from Armitage Ave. cars, from Milwaukee Ave. Ex., from south bound Western Ave. cars, from east bound North Ave. cars, from south bound Robey St. cars, from east bound Desplaines and Clinton cars at North Ave., from south bound Desplaines and Clinton cars, at Noble St., from east bound north side Division St. and Chicago Ave. cars.

NO. 2 A.

Milwaukee Ave. Ex. receives and issues transfers to and from Milwaukee Ave. Cable cars.

NO. 3 A.

West bound Armitage Ave. cars issue transfers to north or south bound California Ave. cars. Also receive transfers from north or south bound California Ave. cars and from Cable cars at Cable station.

NO. 3 B.

East bound Armitage Ave. cars issue transfers to north or south bound California Ave. cars and to Milwaukee Ave. Cable cars. Also receive transfers from north or south bound California Ave. cars.

NO. 4 A.

South bound Desplaines and Clinton cars issue transfers to south bound Milwaukee Ave. cars at North Ave. and again at Noble St., to north and south bound California Ave. cars, Western Ave. cars and Robey St. cars.

NO. 4 B.

South bound Desplaines and Clinton cars receive transfers from east bound Indiana St. cars at Milwaukee Ave., from east bound Grand Ave. cars at Milwaukee Ave., from north or south bound Robey St. cars at North Ave., and from east bound north or west side Chicago Ave. cars at Milwaukee Ave., from north and south bound California Ave. cars and Western Ave. cars at North Ave. and from east bound W. Division St. cars.

North bound Desplaines and Clinton cars receive transfers from north bound Milwauke Ave. cars at Noble St. and again at North Ave. from north and south bound Robey St. cars, California Ave. cars and Western Ave. cars at North Ave.

NO. 5 A.

North bound Desplaines and Clinton cars issue transfers to west bound Grand Ave. cars at Milwaukee Ave., to west bound Indiana St. cars at same place, to north and south bound Robey St. cars, California Ave. cars, Western Ave. cars and to west bound north and west side Chicago Ave. cars at Milwaukee Ave., to west bound Division St. cars at Milwaukee Ave.

SPECIAL.

East bound Milwaukee Ave. cars issue transfers to south bound Halsted St. cars, north bound Milwaukee Ave. cars receive transfers from north bound Halsted St. cars. Halsted St. conductors issue transfers at this point providing passenger boards cars at or north of Madison St. paying cash fare or transfer.

TRANSFER POINTS ON LINES TERMINATING AT NOBLE STATION.

NO. 1 A.

North and south bound Ashland Ave. cars issue transfers to east or west bound North Ave. cars, to North and West Side Division and Chicago Ave. cars, to east bound Sangamon and Center Ave. cars at Erie and Ashland Ave., to east or west bound Grand Ave. cars, Indiana St. cars, Lake St. cars, Madison St. cars, Ogden Ave. cars, Van Buren St. cars, Harrison St. cars, Taylor St. cars, 12th St. cars, at Ashland Ave. and at Paulina St., 14th St. cars, 18th St. cars, 21st St. cars, and to west bound Blue Island Ave. cars.

NO. 1 B.

North and south bound Ashland Ave. cars receive transfers from east or west bound North Ave. cars, Division St. cars both lines, Chicago Ave. cars both lines, from Center Ave. cars at Erie St. when north bound only, from east or west bound

Grand Ave. cars, Indiana St. cars, Lake St. cars, Madison St. cars, Ogden Ave. cars, Van Buren St. cars, Harrison St. cars, Taylor St. cars, 12th St. cars at Ashland Ave. and Paulina St., 14th St. cars, 18th St. cars, 21st St. cars when north bound receive transfers from east bound Blue Island Ave. cars.

NO. 2 A.

Center Ave. cars issue transfers to north bound Ashland Ave. cars at Erie St. North and south bound Center Ave. cars issue transfers to east or west bound Grand Ave. cars, Indiana St. cars, Lake St. cars, Ogden Ave. cars, Madison St. cars, Harrison St. via Center Ave. cars at Adams and Sangamon St., Van Buren St. cars, Harrison via Clinton St. cars at Harrison St., Taylor St. cars, 12th St. cars, 14th St. cars, 18th St. cars, south bound Center Ave. to south bound Blue Island Ave. cars. South bound Center Ave. cars issue to east and west bound 21st St. cars.

NO. 2 B.

Center Ave. cars receive transfers from south bound Ashland Ave. cars at Erie St. North and south bound Center Ave. cars receive transfers from east or west bound Grand Ave. cars, Indiana St. cars, Lake St. cars, Ogden Ave. cars, Madison St. cars, Harrison St. cars via Center Ave. at Sangamon and Adams St., from Van Buren St. cars, Harrison St. cars, Taylor St. cars, 12th St. cars, 14th St. cars, 18th St. cars. North bound Center Ave. cars receive from north bound Blue Island Ave. and from east and west bound 21st St. cars.

SPECIAL.

Sangamon and Center Ave. cars issue transfers to following lines when running to and from barn morning and evening (that is, provided passegers board cars while same are running on Ashland Ave. and pay a cash fare), they issue transfers punched from Ashland Ave. to east or west bound Chicago Ave. cars both lines, Division St. cars both lines, and to North Ave. cars.

Also receive transfers when running into barn from east or west bound Chicago Ave. cars both lines, Division St. cars both lines, and from North Ave. cars.

TRANSFER POINTS ON LINES TERMINATING AT WESTERN AVE. STATION.

NO. 1 A.

South bound Western Ave. cars issue transfers to east bound Milwaukee Ave. cars, to east and west bound North Ave. cars, Division St. cars, Chicago Ave. cars both North and West Side lines, to east bound Indiana St. cars, to east and west bound Grand Ave. cars, Lake St. cars, Madison St. cars, Van Buren St. cars, Harrison St. cars, to east bound Taylor St. cars, to east and west bound 12th St. cars, east and west bound Ogden Ave. cars, 21st St. cars, to west bound 26th St. cars, and east and west bound Desplaines and Clinton cars at North Ave.

NO. 1 B.

South bound Western Ave. cars receive transfers from east or west bound North Ave. cars, Division St. cars, and Chicago Ave. cars, both North and West Side, from west bound Indiana St. cars, from east or west bound Grand Ave. cars, Lake St. cars, Madison St. cars, Van Buren St. cars, Harrison St. cars, from east or west bound 12th St. cars, Ogden Ave. cars and 21st St. cars, and from east and west bound Desplaines and Clinton cars at North Ave.

NO. 1 A.

North bound Western Ave. cars issue transfers to east or west bound 21st St. cars, Ogden Ave. cars, 12th St. cars, to east bound Taylor St. cars, to east or west bound Harrison St. cars, Van Buren St. cars, Madison St. cars, Lake St. cars, and Grand Ave. cars, to east bound Indiana St. cars, to east or west bound Chicago Ave. and Division St. cars, both North and West Side, and to North Ave. cars, to east or west bound Desplaines and Clinton cars at North Ave.

NO. 1 B.

North bound Western Ave. cars receive transfers from east bound 26th St. cars, from east or west bound 21st St. cars, from east bound Ogden Ave. cars, from east or west bound 12th St. cars, from east or west bound Harrison St. cars, Van Buren St. cars, Madison St. cars, Lake St. cars, Grand Ave. cars, from west bound Indiana St. cars, from east or west bound Chicago Ave. cars, and Division St. cars, both north and west side from North Ave. cars, and from north bound Milwaukee Ave. cable cars, and from east and west bound Desplaines and Clinton cars at North Ave.

NO. 2 A.

East bound Taylor St. cars issue transfers to north or south bound Robey St. cars, Paulina St. cars, Center Ave. cars, to east bound Blue Island Ave. cars, and to north or south bound South Halsted St. cable cars.

NO. 2 B.

East bound Taylor St. cars receive transfers from north or south bound Western Ave. cars, Robey St. cars, Paulina St. cars, Center Ave. cars.

NO. 2 A.

West bound Taylor St. cars issue transfers to north or south bound Western Ave. cars, Robey St. cars, Paulina St. cars, Center Ave. cars, and South Halsted St. Cable cars.

NO. 2 B.

West bound Taylor St. cars receive transfers from north or south bound South Halsted St. Cable cars, from west bound Blue Island Ave. cars, from north or south bound Center Ave. cars, Paulina St. cars, Robey St. cars.

NO. 3 A.

East or west bound Lake St. Cars issue transfers to north or south bound Kedzie Ave. cars, Western Ave. cars, Robey St. cars, Paulina St. cars and Center Ave. cars.

NO. 3 B.

East or west bound Lake St. cars receive transfers from north or south bound Kedzie Ave. cars, Western Ave. cars, Robey St. cars, Paulina St. cars and Center Ave. cars.

NO. 4 A.

East bound Grand Ave. cars issue transfers to north or south bound Kedzie Ave. cars, Western Ave. cars, Robey St. cars, Ashland Ave. cars, Center Ave. cars to east bound Indiana St. cars at Milwauke Ave., and to south bound Desplaines and Clinton cars at Milwaukee Ave.

NO. 4 B.

East bound Grand Ave. cars receive transfers from north or south bound Kedzie Ave. cars, Western Ave. cars, Robey St. cars, Ashland Ave. cars, Center Ave. cars, and from east bound Chicago Ave. cars.

NO. 4 A.

West bound Grand Ave. cars issue transfers to north or south bound Western Ave. cars, Robey St. cars, Ashland Ave. cars, Center Ave. cars and to west bound Chicago Ave. cars.

NO. 4 B.

West bound Grand Ave. cars receive transfers from west bound Indiana St. cars, at Western Ave., from north bound Desplaines and Clinton cars at Milwaukee Ave., from north or south bound Center Ave. cars, Ashland Ave. cars, Robey St. cars, Western Ave. cars, and from Kedzie Ave. cars.

NO. 5 A.

East bound Indiana St. cars issue transfers to north or south bound Robey St. cars, Ashland Ave. cars, Center Ave. cars, to south bound Desplaines and Clinton cars at Milwaukee Ave. and north bound Clark St. Cable cars.

NO. 5 B.

East bound Indiana St. cars receive transfers from north or south bound Western Ave. cars, Robey St. cars, Ashland Ave. cars, Center Ave. cars, and from east bound Grand Ave. cars at Halsted St. and Milwaukee Ave.

NO. 5 A.

West bound Indiana St. cars issue transfers to north or south bound Center Ave. cars, Ashland Ave. cars, Robey St. cars, Western Ave. cars, and to west bound Grand Ave. cars.

NO. 5 B.

West bound Indiana St. cars receive transfers from south bound Clark St. Cable cars, from north bound Desplaines and Clinton cars at Milwaukee Ave., from Center Ave. cars, Ashland Ave. cars, Robey St. cars when north or south bound.

NO. 6 A.

South bound Robey St. cars issue transfers to east or west bound North Ave. cars, Chicago Ave. cars, Division St. cars, north and west side, to Grand Ave. cars, Indiana St. cars, Lake St. cars, Madison St. cars, Van Buren St. cars, Harrison St. cars, to west bound Ogden Ave. cars, to east bound Desplaines and Clinton cars at North Ave., to south bound Milwaukee Ave. cars, to east or west bound Taylor St. cars, 12th St. cars, and to east bound 14th St. cars.

NO. 6 B.

South bound Robey St. cars receive transfers from east or west bound Fullerton Ave. cars, North Ave. cars, from east or west bound Desplaines and Clinton cars at North Ave., from east or west bound north or west side Division St. cars, and Chicago Ave. cars, Grand Ave. cars, Indiana St. cars, Lake St. cars, Madison St. cars, Van Buren St. cars, Harrison St. cars, from west bound Ogden Ave. cars, and from east or west bound Taylor St. and 12th St. cars.

NO. 6 A.

North bound Robey St. cars issue transfers to east or west bound 12th St. cars, Taylor St. cars, to east bound Ogden Ave. cars, to east or west bound Harrison St. cars, Van Buren St. cars, Madison St. cars, Lake St. cars, Indiana St. cars, Grand Ave. cars, to both north and west side Chicago Ave. cars, Division St. cars, to North Ave. cars, and to east or west bound Fullerton Ave. cars, to north or south bound Desplaines and Clinton cars at North Ave.

NO. 6 B.

North bound Robey St. cars receive transfers from west bound 14th St. cars, from east or west bound 12th St. cars, and Taylor St. cars, from east bound Ogden Ave. cars, from east or west bound Harrison St. cars, Van Buren St. cars, Madison St. cars, Lake St. cars, Indiana St. cars, Grand Ave. cars, and from north or west side Chicago Ave. and Division St. cars, from west bound Milwauke Ave. cars, and from east or west bound North Ave. cars, and from east and west bound Desplaines and Clinton cars.

APPENDIX G.

Streets on Which Tracks of Chicago City Railway Company are Laid, and Distances in Feet of Street and Single Track.

STREET	FROM	TO	FEET
Van Buren street	Wabash avenue	Clark street	1,281
18th street	Indiana avenue	State street	1.355
21st street	State street	Dearborn street	415
22nd street	Cottage Grove avenue	Chicago river	5,064
26th street	Cottage Grove avenue	Halsted street	7,915
29th street	South Canal street	Wallace street	875
31st street	Lake avenue	Archer avenue	13,800
35th street	Cottage Grove avenue	California avenue	22,927
38th street	Archer avenue	Central Park avenue	7,488
39th street	Cottage Grove avenue	Halsted street	10,655
Root street	State street	Halsted street	5,696
43rd street	Lake avenue	State street	7,959
47th street	Lake avenue	Kedzie avenue	30,508
51st street	Grand boulevard	Stewart avenue	5,067
51st street	Wallace street	Wood street	7,946
55th street	Cottage Grove avenue	Around Loop	7,684
59th street	State street	Leavitt street	14,502
61st street	Midway and Washington	Wentworth avenue	11,359
63rd street	Stony Island avenue	City Limits	42,647
East 63rd street	North Loop		1,604
East 63rd street	South Loop		1,392
68th street	Cottage Grove avenue	Rhodes avenue	1,653
Rhodes avenue	68th street	South Chicago avenue	100
Keefe avenue	South Chicago avenue	69th street	777
79th street	Vincennes road	Halsted street	2,680
69th street	Keefe avenue	Western avenue	18,925
Vincennes road	68th street	79th street	7,895
South Chicago avenue	Cottage Grove avenue	Grand Crossing	3,640
Archer avenue	State street	City Limits	38,389
Cottage Grove avenue	22nd street	71st street	32,842
Indiana avenue	18th street	51st street	20.336
Cottage Grove Loop	North of Madison		2,653
State street Loop	North of Madison		3,576
Wabash avenue	Madison street	22nd street	10,750
State street	Madison street	Vincennes road	41,076
Clark street	Washington street	22nd street	10,963
Wentworth avenue	Archer avenue	73rd street	33,560
South Canal street	Archer avenue	29th street	3,352
Wallace street	29th street	Root street	8,361
Halsted street	O'Neil street	79th street	36,320
Main and Morgan	Archer avenue	39th street	7,745
Ullman street	31st street	35th street	2,643
Center avenue	47th street	75th street	18,611
Ashland avenue	Archer avenue	70th street	25,373
Oakley avenue	47th street	49th street	1,050
Western avenue	Archer avenue	71st street	22,265
Kedzie avenue	38th street	63rd street	16,537
Dearborn street	Archer avenue	21st street	590

Feet of Double Track, 580,841
Feet of Single Track, 1,161,662
Miles of Single Track, 220

Miles of Street, 110.

Cable, 34.75 miles
Electric, 183.38 miles
Horse, 1.87 miles

Total, 220.00 miles Single Track.

APPENDIX H.

Streets on which tracks of the Chicago Union Traction Co. are laid, and distances in feet of Street and Single Track.

NORTH CHICAGO STREET RAILROAD CO. SYSTEM.

STREET	FROM	TO	Feet Street Distance.	Feet Single Track.
Ashland avenue	Lincoln avenue	Graceland avenue	5,328	10,655
Belmont avenue	Lincoln avenue	Robey street	2,626	5,252
Center street	Clark street	Lincoln avenue	750	1,500
Chicago avenue	Clark street	Milwaukee avenue	6,695	13,390
Clark street	Washington street	Illinois street	2,771	5,542
Clark street	Illinois street	Limits barns	15,729	31,457
Clark street	Limits Barns	Devon avenue	26,642	53,283
Clybourn avenue	Division street	Cable terminus	10,386	20,770
Clybourn avenue	Cable Terminus	Belmont avenue	8,090	16,180
Dearborn street	Polk street	Van Buren street	1,687	3,373
Dearborn street	Van Buren street	Monroe street	1,400	2,780
Dearborn street	Monroe street	Randolph street	1,374	2,747
Dearborn street	Randolph street	Kinzie street	1,731	3,462
Division street	State street	Milwaukee avenue	10,252	20,503
Evanston avenue	Diversey street	Graceland avenue	7,576	15,153
Fullerton avenue	Lincoln avenue	Milwaukee avenue	13,946	27,892
Garfield avenue	Lincoln avenue	Racine avenue	4,627	4,627
Graceland avenue	Evanston avenue	Ashland avenue	5,039	10,077
Halsted street	Chicago R. H. Branch	Evanston avenue	20,207	40,413
Illinois street	Clark street	Wells street	802	1,603
Illnois street	Wells street	Market street	806	806
Indiana street	State street	Milwaukee avenue	5,467	10,933
Kinzie street	State street	Market street	2,449	4,699
Larrabee street	Chicago avenue	Webster avenue	9,263	18,530
LaSalle street	Illinois street	Randolph street	1,129	2,258
La Salle street	Randolph street	Monroe street	1,382	1,382
Lincoln avenue	Center street	Cable terminus	5,942	11,885
Lincoln avenue	Wrightwood avenue	Belmont avenue	5,636	11,272
Market street	Kinzie street	Chicago avenue	2,710	5,420
Market street	Chicago avenue	Division street	2,645	2,645
Michigan street	Wells street	Market street	805	805
Monroe street	Dearborn street	LaSalle street	806	806
North avenue	Clark street	Milwaukee avenue	12,394	24,788
Racine avenue	Clybourn avenue	Fullerton avenue	2,970	2,970
Randolph street	Dearborn street	LaSalle street	802	802
Roby street	Belmont avenue	Roscoe Boulevard	1,329	2,658
Roscoe Boulevard	Robey street	Western avenue	2,560	5,120
Sedgwick street	Chicago avenue	Division street	2,644	2,644
Sedgwick street	Division street	Center street	5,296	10,592
Sheffield avenue	Lincoln avenue	Clark street	5,606	11,212
Southport avenue	Clybourn place	Clark street	14,827	29,655
State Street	Division street	Lake street	6,558	13,116
Webster avenue	Lincoln avenue	Racine avenue	3,957	3,958
Wells street	Randolph street	Illinois street	2,302	5,603
Wells street	Illinois street	Clark street	9,354	18,708
Center street	Sedgwick street	Racine avenue	5,289	5,289
			262,589	498,418

Miles of street	49.73
Cable	18.23
Electric	75.15
Horse	.76
	94.14 miles single track.

APPENDIX H.—Continued.

WEST CHICAGO STREET RAILROAD CO. SYSTEM.

STREET	FROM	TO	Feet Street Distance.	Feet Single Track.
Ashland avenue	Twelfth street	Twenty-second street	5,262	10,524
Ashland avenue	Lake street	Clybourn place	11,175	22,350
Adams street	Center avenue	Michigan avenue	8,753	17,506
Armitage avenue	Forty-fourth avenue	Milwaukee avenue	12,587	25,174
Austin avenue	Center avenue	Desplaines street	3,632	7,264
Blue Island avenue	Harrison street	Western avenue	14,532	29,064
Clybourn place	Wood street	Ashland avenue	1,300	2,600
Chicago avenue	Kedzie avenue	Milwaukee avenue	14,059	28,118
Clinton street	Twelfth street	Milwaukee avenue	6,996	11,712
Canal street	Harrison street	Canalport avenue	5,923	11,846
Canalport avenue	Canal street	Halsted street	2,446	4,892
California avenue	Chicago avenue	Elston avenue	15,777	31,554
Center avenue	Erie street	Austin avenue	1,255	2,510
Center avenue	Adams street	Twenty-first street	9,536	19,072
Colorado avenue	Douglas boulevard	Madison street	7,024	14,048
Division street	Mozart avenue	Milwaukee avenue	8,615	17,230
Desplaines street	Austin Avenue	Harrison street	5,944	11,888
Erie street	Ashland avenue	Center avenue	2,610	5,220
Eighteenth street	Leavitt street	State street	13,059	26,118
Fifth avenue	Randolph street	Twelfth street	6,221	12,442
Franklin street	Washington street	Harrison street	3,288	6,576
Fourteenth street	Robey street	Canal street	10,040	20,080
Fortieth avenue	Grand avenue	North avenue	1,487	2,854
Grand avenue	Fortieth avenue	Milwaukee avenue	22,892	45,784
Halsted street	North Branch	South Branch	17,570	35,140
Harrison street	Kedzie avenue	State street	21,201	42,402
Jefferson street	Van Buren street	Meagher street	4,884	7,036
Jefferson street	Washington street	Madison street	490	980
Kedzie avenue	Twelfth street	Fulton street	7,225	14,450
Leavitt street	Grand avenue	Chicago avenue	1,648	3,496
Leavitt street	Eighteenth street	Blue Island avenue	3,972	7,944
La Salle street	Madison street	Randolph street	922	922
Lake street	Forty-eighth avenue	State street	32,273	64,546
Madison street	Fortieth avenue	State street	26,712	53,424
Michigan avenue	Washington street	Adams street	1,380	2,290
Milwaukee avenue	Lake street	Belmont avenue	30,548	61,096
North Avenue	Forty-sixth avenue	Milwaukee avenue	17,273	34,546
O'Neil street	Halsted street	West	517	1,034
Odgen avenue	Fortieth street	Randolph street	20,879	41,758
Polk street	Canal street	Fifth avenue	1,570	3,140
Paulina street	Lake street	Twelfth street	6,680	13,360
Randolph street	Lake street	Michigan avenue	11,220	20;946
Robey street	Blue Island avenue	Eighteenth street	3,243	6,486
Robey street	Fourteenth street	Fullerton avenue	22,044	39,825
Sangamon street	Austin avenue	Adams street	4,025	8,050
State street	Madison street	Lake street	1,350	2,654
Taylor street	Western avenue	Fifth avenue	15,458	30,916
Twelfth street	Fortieth avenue	Wabash avenue	26,963	53,946
Twenty-first street	Douglas boulevard	Halsted street	14,191	28,382
Twenty-sixth street	Fortieth avenue	Blue Island avenue	10,802	21,604
Van Buren street	Kedzie avenue	State street	21,206	42,412
Washington street	Desplaines street	Michigan avenue	5,339	10,678
Western avenue	Blue Island avenue	Elston avenue	31,658	63,316
Noble street	Milwaukee avenue	North avenue	5,039	10,078
Van Buren tunnel	Clinton street	Franklin street	1,564	3,128
			564,369	1,116,391

Miles of street	106.89
Cable	29.37
Electric	175.96
Horse	6.36
Total	211.69 miles single track

North Chicago and West Chicago systems combined:

Cable	47.60 miles
Electric	251.11 "
Horse	7.12 "
Total	305.83 miles single track

APPENDIX I.

Streets on which tracks of the Chicago Consolidated Traction Co. are laid and distances in feet of Street and Single Track.

STREET	FROM	TO	Feet Street Distance	Feet Single Track
Central avenue	25th street	26th street	669.6	1339.2
Chicago avenue	40th street	Kedzie street	5440.0	10880.0
Chicago avenue	48th street	Harlem avenue	16163.5	32367.0
Desplaines avenue	Madison street	12th street	5634.8	11269.6
5th avenue	Lake street	Madison street	3715.5	4348.5
52nd street	25th street	36th street	6595.6	2728.6
48th street	Chicago avenue	Ogden avenue	18309.2	36618.4
40th street	Madison street	Ogden avenue	3113490.0	22914.0
Ful. and Ashland avenue	Morgan street	Western avenue	9522.7	19045.4
Harlem avenue	Chicago avenue	Madison street	5304.3	10608.6
Harlem avenue	31st street	Ogden avenue	4401.0	4631.0
Kedzie avenue	Fulton avenue	Chicago avenue	3328.2	6656.4
Lake Street	48th street	5th avenue	25707.1	51018.9
Madison street	40th street	19th street	35563.7	63179.1
Monroe street	Canal street	Morgan street	3312.9	6625.8
Morgan street	Monroe street	Fulton street	2307.8	4615.6
19th avenue	Madison street	C. & N. W. R. R.	4213.8	4408.0
Ogden avenue	40th street	48th street	5757.7	11515.4
Ogden avenue	Harlem avenue	Lyons avenue	6715.0	10970.5
Ridgeland avenue	26th street	Stanley street	2752.4	5504.8
Stanley street	Ridgeland street	Harlem avenue	5641.0	11282.0
St. Charles	19th street	5th avenue	4728.6	4873.2
31st street	40th street	44th street	2636.5	5273.0
12th street	40th street	Desplaines street	25505.4	52521.8
26th street	40th street	48th street	5281.6	10563.2
26th street	Central avenue	Ridgeland avenue	5328.8	10657.6
25th street	48th street	Central avenue	5365.0	10730.0
Balmoral street	Robey street	Ravenswood avenue	1363.0	2726.0
Belmont avenue	Halsted street	Lincoln avenue	5292.0	10584.0
Belmont avenue	Robey street	Milwaukee avenue	12402.8	24805.6
California avenue	Belmont avenue	Roscoe avenue	1191.2	2331.2
Chicago avenue	Devon avenue	Dempster street	15954.3	31908.6
Central avenue	Sherman avenue	Bennett street	7913.2	15826.4
Clybourn place	Clybourn Pl.	Elston avenue	2272.0	4544.0
Crosby avenue	Larrabee street	Division street	1848.7	3697.4
Crawford street	Elston avenue	Cemetery	6829.0	13658.0
Devon avenue	Evanston avenue	Chicago avenue	2764.5	5529.0
Elm street	Franklin street	Crosby street	2689.3	5378.6
Elston avenue	Milwaukee ave	Montrose avenue	31542.3	63064.6
Erie street	Franklin street	Bridge	2260.7	4521.4
Evanston avenue	Graceland avenue	Devon avenue	16461.6	32923.2
Franklin street	Kinzie street	Elm street	5000·5	10001.0
Irving Park	Ashland avenue	Dunning street	33236.2	66472.4
Kingsbury	Chicago avenue	Erie street	945.7	1891.4
Lawrence avenue	Evanston avenue	Milwaukee avenue	27644.3	55288.6
Lincoln avenue	Belmont avenue	N. 59th.	15231.1	30462.2
Milwaukee avenue	Logan sq.	Lawrence avenue	21158.0	42316.0
Montrose avenue	Evanston avenue	Stewart avenue	23964.9	47929.8
Ravenswood ave	Balmoral avenue	Bryn Mawr avenue	2488.3	4976.6
Robey street	Irving Park	Balmoral avenue	9315.1	18639.2
Sherman avenue	Dempster street	Central Avenue	8391.5	16783.0
Western avenue	Elston avenue	Belmont avenue	1804.0	3608.0
Dempster street	Chicago avenue	Sherman avenue	222.2	444.4
		Total Feet	493598.1	957667.2
		Total Miles	93.48	181.38
		Total Feet Outside City Limits	154,410.3	283,804.1
		Total Miles Outside of City Limits	29.24	53.75
		Total Feet Inside of City Limits	339,187.8	673,663.1
		Total Miles Inside of City Limits	64.24	127.63

APPENDIX J.

Streets recommended, on which to construct Tracks in the creation of the system outlined in Part 5, showing Mileage of Street, Type of Track and amount in Feet and Miles, giving amount to be constructed in Subways and amount of Underground Conduit Type for terminals and distributing system in business center.

STREET	FROM	TO	Distance in feet of Double Track
79th street	Vincennes avenue	Halsted street	2,680
69th street	Western avenue	Keefe avenue	18,925
Keefe avenue	69th street	Sixty-eighth street	777
68th street	Keefe avenue	Cottage Grove avenue	1,653
63rd street	Central avenue	Stony Island avenue	42,647
59th street	Leavitt street	State street	14,502
61st street	State street	Washington avenue	9,537
Washington avenue	61st street	Sixtieth street	516
Jefferson avenue	62nd street	Sixty-fourth street S. T.	2,996
64th street	Jefferson avenue	Jackson Park avenue S. T.	
62nd street	Jefferson avenue	Jackson Park avenue S. T.	
Jackson Park	64th street	Sixty-second street S. T.	
So. Chicago avenue	Cottage Grove avenue	Illinois Central railroad	3,640
55th street	Cottage Grove avenue	Lake avenue	7,684
Jefferson avenue	55th street	Private court S. T	
Private Court	Jefferson avenue	Lake avenue S .T	
Lake avenue	Private Court	Fifty-fifth streetS. T	
51st street	Wood street	Indiana avenue	11,901
50th street	Indiana avenue	Cottage Grove avenue	3,960
52nd street	Cottage Grove avenue	Lake avenue	4,752
47th street	Kedzie avenue	Lake avenue	30,508
43rd street	State street	Lake avenue	7,959
Root street	Stock Yards	State street	5,696
39th street	Halsted	Cottage Grove avenue	10,655
38th street	Central Park avenue	Archer avenue	7,488
35th street	California avenue	Cottage Grove avenue	22,927
31st street	Pitney Court	Illinois Central railroad	13,800
Pitney Court	31st street	Archer Avenue	
29th street	Wallace street	Canal street	875
26th street	Halsted street	Cottage Grove avenue	7,915
22nd street	Indiana avenue	46th avenue	31,680
21st street	Douglas Pk. Blvd	Halsted street	14.191
18th street	Leavitt street	Indiana avenue	15,840
26th street	48th avenue	Blue Island avenue	16,082
14th street	Robey street	Canal street	10,040
12th street	60th avenue	5th avenue	38,016
Taylor street	Western avenue	Canal street	12,672
Harrison street	48th avenue	Chicago River	29,040
Van Buren street	Kedzie avenue	Chicago River	18,348
Adams street	Center avenue	Chicago River	5,280
Madison street	60th avenue	Chicago River	36,960
Washington street	Desplaines street	Jefferson street	320
Randolph street	Ogden avenue	Chicago River	7,128
Lake street	60th avenue	Chicago River	37,060
Grand avenue	North avenue	Chicago River	27,060
Indiana avenue	Chicago River	North State street	3,432
Chicago avenue	60th avenue	North Clark street	38,808
Division street	California avenue	North Clark street	18,216
North avenue	46th avenue	North Clark street	29,667
Armitage avenue	44th avenue	Elston avenue	18,480
Clybourn place	Ashland avenue	Clybourn avenue	2,904
Center street	Racine avenue	North Clark street	6,204
Fullerton ave,	44th avenue	North Clark street	25,872
Diversey ave. or parallel st.	44th avenue	North Clark street	25,344

APPENDIX J.—Continued.

STREET	FROM	TO	Distance in Feet of Double Track
Belmont avenue	Milwaukee avenue	Halsted street	19,932
Addison street	Milwaukee avenue	Halsted street	22,968
Irving Pk. Blvd.	Sixtieth avenue	Evanston avenue	33,792
Montrose avenue	Forty-eighth avenue	Evanston avenue	23,892
Lawrence avenue	Milwaukee avenue	Evanston avenue	26,928
Balmoral avenue	Robey street	E. Ravenswood Park	1,363
Devon avenue	North Clark street	Evanston avenue	2,764
Fifty-sixth street	State street	South Park avenue	2,640
Fifty-sixth street	Stony Island avenue	Lake avenue	200
Cottage Grove avenue	Seventy-first street	Twenty-second street	32,842
Indiana avenue	Sixty-third street	Eighteenth street	27,720
Vincennes avenue	Seventy-ninth street	State street	7,895
State street	Vincennes avenue	Fourteenth street	33,792
Wabash avenue	Twenty-second street	Fourteenth street	3,960
Vincennes avenue	Thirty-fifth street	Forty-third street	5,280
St. Lawrence avenue	Forty-third street	Fifty-first street	5,280
Lake avenue	Forty-seventh street	Fifty-seventh street	6,336
Stony Island avenue	Fifty-sixth street	Sixty-second street	3,696
Clark street	Twenty-second street	Fourteenth street	3,960
Wentworth avenue	Vincennes avenue	Archer avenue	33,560
Wallace street	Root street	Twenty-ninth street	8,361
Canal street	Twenty-ninth street	Archer avenue	3,352
Canal street	Eighteenth street	Harrison street	5,923
Clinton street	Harrison street	Mill avenue	4,356
Desplaines street	Harrison street	Mill avenue	5,016
Archer avenue	Forty-eighth avenue	State street	38,389
Canalport avenue	Halsted street	Eighteenth street	2,446
N. State street	Indiana street	North avenue	6,864
N. Clark street	Indiana street	Howard avenue	50,290
Wells street	Indiana street	N. Clark street	8,712
Orleans street	Indiana street	Division street	4,224
Sedgwick street	Chicago avenue	Center street	7,656
Larrabee street	Chicago avenue	Lincoln avenue	9,108
Evanston avenue	Clark street	Halsted street	7,037
Evanston avenue	Halsted street	Devon avenue	17,040
Halsted street	Seventy-ninth street	Evanston avenue	74,096
Sheffield avenue	Lincoln avenue	N. Clark street	5,606
Racine avenue	Clybourn avenue	Fullerton avenue	2,970
Southport avenue	Clybourn place	North Clark street-	14,824
Center avenue	Seventy-fifth street	Milwaukee avenue	49,632
Ashland avenue	Sixty-ninth street	Twelfth street	34,980
Paulina street	Twelfth street	Lake street	6,680
Ashland avenue	Lake street	Clybourn place	11,175
Ashland avenue	Belmont street	Irving Park boulevard	5,328
Robey street	Sixty-ninth street	Balmoral avenue	75,240
E. Ravenswood Pk	Balmoral avenue	Ent. Rose Hill Cem	2,488
Leavitt street	Blue Island avenue	Eighteenth street	3,972
Western avenue	Seventy-first street	Lawrence avenue	72,864
California avenue	Twenty-sixth street	Belmont avenue	33,792
Kedzie avenue	Sixty-third street	Elston avenue	59,400
40th avenue	Thirty-first street	Bryn Mawr avenue	53,328
48th avenue	Twenty-sixth street	Chicago avenue	18,216
Lincoln avenue	Center street	North Fifty-ninth street	26,809
Clybourn avenue	Division street	Belmont street	18,476
Elston avenue	Milwaukee avenue	Montrose avenue	31,542
Milwaukee avenue	Lake street	Lawrence avenue	51,706
Colorado avenue	Forty-eighth avenue	Madison street	13,896
Ogden avenue	Forty-eighth avenue	Randolph street	26,636

Distance on street, feet double track 1,873,567
Feet single track 3,747,134
Miles single track 709 68-100

SUMMARY OF APPENDIX J.

Street Mileage	1,873,567 feet	354.84 miles
Track Mileage:—		
Overhead trolley	3,747,134 feet	709.68 miles
Overhead trolley or third rail in subway	79,520 feet	15.06 miles
Total Overhead Trolley	3,826,654 feet	724.74 miles
Underground Conduit terminals and distributing system	111,300 feet	21.07 miles
Total Single Track	3,937,954 feet	745.81 miles

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